APPLICATION OF KANSEI ENGINEERING METHOD IN THE DEVELOPMENT OF E-GOVERNMENT JOB PORTALS

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by

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CERTIFICATION OF APPROVAL

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Approved by,

_____
Goh Kim Nee

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TRONOH, PERAK
May 2015

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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TEOH MING MIIN

ABSTRACT

Nowadays, companies often find it difficult to predict consumers' needs and requirements and have been looking for ways to quantify customers' impression on their products. Kansei Engineering (KE) is a method originated from Japan that could be used in achieving the companies' goal. This method is often used in human-oriented product development to generate products with improved economic value. In this study, Kansei Engineering is applied in website development. This study reveals that e-government websites in Malaysia have lower usability values among the others website domains. There is a significant potential of improving the usability value of the e-Government job portals by implementing a effective usability testing methodology on them. This study aimed to use usability as a testing method by applying Kansei Engineering in the evaluation of e-Government job portals in Malaysia. This study proposes to improve the quality of job-seeking website managed by Malaysia government by measuring the user experience of the website users. The research is aimed to address the dominant factors that affect the impression of a user on the website as well as to compare the design elements of other sample job-seeking websites. Methodologies devised from the investigation are based on proven and existing approaches by other researchers of the same field. Thus, recommendations obtained and analysis of the results shall be useful to guide the improvement of existing job portals to better serve the good cause of its existence.

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I personally hope that this record could be used as a reference for the future works that need to be carried out. The research results and knowledge gained will be applied to ensure the success of study. I am greatful to be given a chance to carry out this meaningful and useful research work with MIMOS and UTP. I wish my work did contribute in the field of usability testing and product design and development.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

In recent years, companies often find it difficult to predict consumers' feelings and impression to their product. Affective engineering was introduced when these companies are looking for ways to quantify the consumers' impression to their product (Linkoping, 2015). Affective engineering is a field of product design that translates human's feelings for a product into design elements. Kansei engineering is one of the methodologies in this field that correlate consumers' impression to a product with the product properties. Professor Mitsuo Nagamachi from Hiroshima International University invented the method. In today's customer-driven economy, taking into account the competitive forces in the market that lead to the demand of high quality products, the approach used to produce a product has changed from 'product-out' to 'market-in' approach (Nagamachi, 1999).

One of the basic lessons we have learned in the human-computer interaction (HCI) field is that usability must be considered before prototyping (Holzinger, 2005). Usability Testing has been widely used during product development as a tool to evaluate users' performance on a certain product. Usability testing methods can be categorized as inspection methods and test methods and examples of these methods including heuristic evaluation, cognitive walkthrough, action analysis and thinking

aloud method. The purpose of conducting a usability test is to view the product from the users' perspective, and whether their intended purposes are fit for the customers. The results are often used as recommendations for the developers in helping them to enhance the usability of the products. There are issues related to the subjective satisfaction of the users and their possible anxieties while doing the test, which are difficult to measure objectively (Holzinger, 2005). Even though by using the questionnaires method the end users' opinions can be collected objectively, but the results are normally insufficient to be applied in the design context. However, the disadvantages of indirect method such as interview are that the discrepancy between subjective and objective users' reactions and it is unable to identify as many problems as other methods.

Researchers believe that Kansei is actually concerned with the user's understanding process on user interface (UI) (YAMANAKA, MIYAZAWA, & KOMAMIYA). Thus, Kansei can be used to create a new analysis method that could catch user behaviors effectively during the process of undestanding the user interface of a website. Based on a GUI usability test carried out by the Graduate School of Art and Design, University of Tsukuba and Toshiba TEC Corporation in Germany, France, United States of America, and Japan, the researchers concluded that although logging tool could catch user's behavior as quantitative data, it could not catch the kansei of users qualitatively(YAMANAKA et al.). Kansei in this context is the psychological feelings of the users, a high-order function of the brain(Nagamachi, 1999). Therefore, in order to aid a designer to have a better analysis tool and so that qualititative data such as users' feelings and emotions can be caught easier, an analysis method that could catch users' experience effectively is needed for most of the designers in the product development process. Some users' emotion and feelings that is hard to express objectively need to be emphasized and taken care of, in order to achieve equilibrium with the technical demands(Lee, Harada, & Stappers, 2002).

Every human being are seeking for pleasant and emotional satisfaction in quality of life (QOL) (Nagamachi, 2010a). Various methods have been developed to support

the valuation of user's satisfaction in the product including Quality Functional Deployment (QFD) (Akao, 1990), Conjoint Analysis (Green & Srinivasan, 1990), Voice of Customer (VOC) (Griffin & Hauser, 1993) and Kansei Engineering (Lokman, 2010; Nagamachi, 1999).These design methods that are classified as customer-focused development method, their goals is to develop products that meet customers' satisfaction and to fulfill their needs (Lokman, 2010). Nonetheless, Kansei Engineering is different from the other methods in such a way that it interprets how a user feels and translates it in the product design domain. Kansei Engineering measures how a person feels but not how a person thinks he feels. Kansei Engineering is "first and foremost a product development methodology, which translate customer's impressions, feelings and demands on existing products or concepts to design solutions and concrete design parameters. Secondly, it shows how Kansei is translated into design" (Schütte, 2005).

Kansei Engineering is a design approach in which attention are given on the behaviors of people when they perceive images or objects, and study how their personal preferences or cultural bases work to their feelings (Lee et al., 2002). As such, this research will use an analysis and evaluation method that could be implemented in various domains, which can be serve as a usability testing method that is more useful and effective to the developers in evaluating their product. The result from the usability testing will then be utilized as a guideline in the website development process, helping the website designer in creating and developing websites that can fulfill users' needs in a better way. In this project, a particular website domain is chosen so that Kansei Engineering method can be applied in the domain in order to help related industries or sectors to maintain and improve their competitiveness. It creates economic values using users' Kansei when a product or service arouses their emotions and empathy (METI, May 2007).

Government websites are chosen out of several other website domains after various studies have been done. In Malaysia, Multimedia Super Corridor (MSC) Malaysia is the ICT initiative in grooming the local ICT industry (MSC, 2012). Multimedia Development Corporation (MDeC) as the blueprint of digital economy in Malaysia

had been putting efforts in spurring the country's ICT industry development and digital economy growth(MDeC, 2014). MdeC launched the first Malaysia Government and Portal Websites Assessment (MGPWA) in 2005 with the aim to serve as a guidance to improve the services of these government portals and websites(MDeC, 2013).The assessment in 2013 has concluded that the 97% of the websites are rated 3-star out of 5-star in the assessment (MDeC, 2013). Therefore, focus need to apportioned appropriately to further enhancement of the criteria and to meet expectations of the users. A study in 2009 has also confirmed that the website presence of Asian e-Government websites is neglecting performance and quality criteria (Jati & Dominic, 2009). A study that evaluate credibility of websites based on users' evaluation proved that the utmost important criteria for a good website is it's design look because when evaluating the credibility of we sites, participants of the study commented on the design look more often than other web site features, 46.1% of their comments are on this particular feature(Fogg et al., 2003). Literature reviews on the website domain, application of KE in other products, and types of Kansei Engineering techniques that are appropriate to be applied in the website domain are needed in order to justified the work conducted and progress of this project.

The rest of this chapter will be organized as follows: the next section will explain the problem statement that indicates the importance of initiating and completing this project. This will then be followed with the objectives section. The aim and goals of this project will be listed in this section. Last part of this chapter will be the scope of study that can better explain the scope of research and serve as a guideline to find solutions for the problems identified in the scope.

1.2 PROBLEM STATEMENT

The problem with the existing analysis methods of product design and development is that the implicit demands of users such as their emotions and impression to a product are often hard to predict. Although there are a lot of customer-oriented analysis model that provides results that could improvise the product, a framework that could quantify customers' impressions into design specifications would ensure more structured design solutions. A research on Kansei Engineering Design Method could remedy the situation where usability of websites unable to improve effectively.

According to the topic proposed, the goal of this project is to use usability as a testing method to apply Kansei Engineering in official e-government websites in Malaysia. The problem with the existing websites is that they are often unable to catch users' attention. Some users even have a hard time in understanding the interfaces of the websites, and it is then definitely even harder for them to operate with it. Therefore, the second problem statement of this project is e-government websites and protals in Malaysia did not achieve their vision and objective to serve as a platform to provide information and services to the citizens.

1.3 OBJECTIVES AND SCOPE OF STUDY

1.3.1 Objectives

The aim of this project is to use usability as a testing method by applying Kansei Engineering in the development of e-government websites in Malaysia.
In order to fulfill the aim of the following objectives will need to be met:

- To study how to apply Kansei concept and methods into design approach
- To design an effective usability testing method by applying Kansei Engineering methodology in the design process
- To determine the factors that contribute significantly to the design of e-Government Job Portal by implementing a Kansei system
- To develop a prototype of e-government websites based on Kansei Engineering usability tests results

1.3.2 Scope of Study

The aim of this project is to conduct usability testing by applying Kansei Engineering that translate users' emotions into quantifiable design solutions and parameters.

The scope of study will focus on concepts, methods and tools in Kansei Engineering. Previous works that involved Kansei Engineering in product development and results of these applications on the products are also studied. The usability testing methods and results analysis tools of Kansei Engineering vary from one another, study need to be done to identify the most suitable way to present the results of research.

The scope of study for the project is minimized to the job portal authorized by Malaysia's government. This job portal is the official site under the ministry of

human resources Malaysia (MOHR) which function is similar to other job search websites of private organization. Study also focused on other job search websites to ease the process of samples gathering for usability test.

Usability problems existed in government websites need to be study to find out the reasons why modification and improvement are needed for these particular website domain. Internet usage trend among Malaysians need to be studied so that target group of users of e-government websites that require the most focus can be determined and futher enhanced. After issues regarding properties to enhance are discovered through the proposed testing methods, the focus will be switched to website development. Last but not least, study will also focus on finding gaps in the existing Kansei design method and steps to be taken in order to make it even more interesting and viable so that it is different and better than the previous works.

CHAPTER 2

LITERATURE REVIEW

2.1 LITERATURE FINDINGS

2.1.1 Problems exist in Malaysia e-government website

Electronic Government (e-Government) was initiated in Malaysia on 24th February 2004 with its vision to bring government, business and citizen to work together for the benefits of the nation. It was an initiative to accelerate Malaysia's entry into Information Age in order to achieve the objectives of the Multimedia Super Corridor (MSC), created in 1996 as one of the strategies to achieve Vision 2020 (MSC, 2012). Based on the Government E-Payment Adoption Ranking (GEAR) conducted by the economist Intelligence Unit, Malaysia was ranked 24th out of 43 countries in the world to adopt e-payment service. This indicate that Malaysians are still not good at utilizing e-services provided by the government (Lean, Zailani, Ramayah, & Fernando, 2009). Other than that, based on an assessment on Malaysian Government and Portal Websites (MGPWA) in 2013, 97% out of the 1,053 government portals and websites are rated 3-star out of 5-star (MDeC, 2013). This assessment serves as a quality measurement tool and can be adopted as the guidelines to benchmarks the services in these portals and websites. 45 over 100 marks for the assessment are weighted on the usability criteria of the websites (MDeC, 2013). According to MGPWA, Malaysia is unable to be in the top ten list of the National Portal Indicator while Singapore has been consistently ranked in the top 2 positions in tight competition with United Kingdom and United States of America (MDeC, 2013). This assessment played an important role in monitoring the growth and performance of Malaysian Government websites

Starting from 2014, MGPWA also provide online self-assessment indicator for Government websites to assess and monitor their performance (MGPWA, 2014). Table 1 shows the ranking of Malaysia from 2005 to 2013 in the International e-government ranking conducted by Waseda University.

TABLE 2.1. The progress of Malaysia in the International e-government Ranking by Waseda University from 2005-2013 (Table adapted from MGPWA 2013)

Year	Ranking	Score	APEC Ranking
2013	**24/55**	**66.26**	**10/20**
2012	23/55	67.1	9/20
2011	24/50	67.37	-
2010	24/40	63.5	-
2009	22/34	63.38	-
2008	18/34	49.4	-
2007	15/32	53.41	-
2006	14/32	N/A	-
2005	9/23	0.925 (index)	-

Based on a study conducted by Latif which took nine highly accessed government websites as the testing platforms, an automated testing tool named as Bobby was chosen to evaluate the accessibility of the websites and the result from the analysis showed that there was no single Malaysian e-government websites that passed the W3C Priority 1 accessibility checkpoints (Latif & Masrek, 2010). Another evaluation conducted to access the usability and accessibility of Malaysia E-Government website using different method also showed that overall usability traits used by the Malaysian e-government websites are comparably poorer that other websites. There are around 125 websites in Malaysia e-government websites with main page size uploaded in more than 34KB, which indicates that the website developers are not concerned about the usability of the websites (Isa, Suhami, Safie, & Semsudin, 2011). Another study that evaluate quality of e-government websites of Korea, Hongkong, Japan, Malaysia and Singapore using web diagnosic tools had showed

that Malaysian e-government website did not meet the criteria as a high-quality website. The server response, load time, size and number of items exceed the value standardized by IBM(Jati & Dominic, 2009).In year 2014, Malaysia's ranking for e-government readiness index is 52 in the world while Singapore, Japan and Korea are in the top 10 of the survey((MCMC), 2014). Table 2 and 3 showed the testing results for 4 Asian e-government websites on different testing aspects.

TABLE 2.2. Testing result for accessibility errors website.
(*Table adapted from Jati and Dominic 2009)*

Sample Website	Accessbility errors 1	Accessibility errors 2	Accessibility errors 3
www.gov.sg (Singapore)	**37**	**242**	**34**
www.korea.gov.kr (Korea)	**2**	**6**	**1**
www.kantei.gov.jp (Japan)	**1**	**10**	**6**
www.gov.hk (Hong Kong)	**0**	**2**	**1**
www.gov.my (Malaysia)	**13**	**246**	**47**

TABLE 2.3. Testing Result for websites performance based on criteria.
(Table adapted from Jati and Dominic 2009)

Website quality category	Singapore	Korea	Japan	Hong Kong	Malaysia
Response time (secs)	1.869	0.982	1.164	0.849	1.462
Load time (<30 secs)	30.79	148.45	65.01	41.94	93.99

Size (<64 KB)	128404	667584	267978	195384	448508
No. of items (<20 items)	26	77	58	15	23
Markup Valudation (0 error)	86 errors	14 errors	15 errors	3 errors	83 errors
Broken link (n0	5	0	0	0	16

The study narrowed down to the current trend and existing problem occurred in the most used e-government websites in Malaysia. For instance, just recently, government wanted all citizens who makes a taxable supply for business purposes and the taxable turnover of that supply exceeds the threshold of RM500,000 to register for the Good and Service Tax (GST) using the e-government service. Government also encourage any business with taxable turnover of RM500,000 and below to register for GST voluntarily. This raises some issues to the citizens because some people who are not so familiar with the operation using IT infrastructure will have problem in operating or even understanding a website with high complexity and low usability. ((GST), 2015).

2.1.2 Internet Usage Trend of Malaysians

It is important to understand trends among Malaysian users and initiatives taken by the government in order to obtain better results for the project. A recent report from Malaysian Communications and Multimedia Commission (MCMCs) shows that the internet users in Malaysia is characterised by its youthfulness. The survey shows that out of all age group, 20-24 years old age group are the one with the most users, followed closely by users who are 25-29 years old ((MCMC), 2012) . Based on a report from MCMC, some of the national policy objectives for the communications and multimedia industry included to grow and nurture local information resources

and cultural representations that facilitates the national identity and global diversity as well as to regulate for the long-term benefit of the end-user and to create a robust applications environment for them((MCMC), 2014). From here, it is clear that Malaysia would expect at least optimal user experience since the government sector includes users' environment in the national objectives.

2.1.3 Methods Used in Usability Testing

Usability of a website is what determine the user experience and his or her perspective on a certain website. It is a quality that can be applied and measured in many different kinds of products. In the software context, according to ISO/IEC 9126, the term usability is associated with user interface design. Usability tests typically involved a user performing a task to test the performance and efficiency in which the task can be completed, and the user's subsequent satisfaction with their performance or the product (Jeffries, Miller, Wharton, & Uyeda, 1991). The common methods used in usability testing include automotive evaluation method, cognitive walkthrough, heuristic evaluation, laboratory testing, remote testing, and thinking aloud testing (Holzinger, 2005).

Most of the time, usability looks only at the functionality and technical context of a product. One of the characteristic that the designers overlook is reliability of the context of a website. The context of the website must be able to invoke trust and to fulfill the individual expectations of a products (Sivaji, Downe, Mazlan, Soo, & Abdullah, 2011). Keen competitions between products and the rapid growth of the markets have resulted in an increasing number of customers who like to express their individual expectations about a product. Even mass-produced products need to be adaptable to meet individual demands in terms of product functionality, product design, product forms as well as in other aspects (Shimizu et al., 2004). Usability inspection and testing are normally conducted at the end of design cycle. At this stage, changes to the interface can be costly; this often leads to some difficulty and the detected problems or changes need to be made became recommendations. Part of

the reason why usability test results are ignored is that the developers think that there are no flaws or problems in their design(Holzinger, 2005). Different usability testing tools and methods has been developed to fulfill some usability characteristics such as efficiency, satisfaction, and learnability. However, the results from the existing usability tests are normally subjective perspective from the users. These results can only used as recommendations due to its subjectivity (Holzinger, 2005). This explained that there's a need to determine users' feelings about a product that can be used as the design parameters. These design parameters are then designed intentionally as a product property and added to the product. Kansei Engineering methodology that quantify the users' emotions can definitely aid in the website development process effectively.

We have seen the evolution of industry and social that was taking place in the Japanese society since the eighties. Some organizations in Japan that used Kansei Engineering in their product development included Mazda that used a category classification method to develop a sports car, Milbon that used the ARTsss model to classify the group of containers according to their design characteristics and to the Kansei words group they belongs to, and Wacoal in designing the brassiere (Nagamachi, 2002). These products are developed using a variety of methods ranging from category classification to the usage of artificial intelligence in the process of development. Nonetheless, all these methods are designed using one similar framework namely Kansei Engineering (KE). KE has been widely regarded as an effective tool for customer-oriented product development, which is able to translate the human Kansei into the product design elements (Nagamachi, 2002). Kansei Engineering can be separated into several types, depending on its complexity and the methods involved. However, all Kansei Engineering types shared the same objective, which is to focus on customers and human aspects at the first place.

2.1.4 History, Definitions and Concepts of Kansei

Popularization of the term ”Kansei” started in 1984 particularly in the Asia region to characterize the changes in consumption behavior in rapid growth of Japanese Economy (Lévy, Shiho, & Yamanaka, 2008). Kansei is recognized by the Japanese Ministry of Economy, Trade and Industry (METI) as the fourth value axis of industrial products to “enhance people’s lifestyles and invigorate the economy” (METI, May 2007) .One of the major event namely “Kansei-Japan Design Exhibition” was held as a kansei value creation fair in Paris in the year 2008 and in USA in the following year. Kansei appeared as a keyword in the design field in both academic and industrial worlds(Lévy et al., 2008). The speech by Kenichi Yamanoto, president of Mazda automotive corporation is the first time the term “Kansei Engineering” is used during a presentation made at Michigan University in 1986(Lévy et al., 2008). The reason he used this term is to relate the research works done by Kenichi and Mitsuo Nagamachi on “Emotional Engineering”. Figure 1 showed the founder of Kansei Engineering, Professor Nagamachi.

FIGURE 2.1. Professor Mitsuo Nagamachi (Founder of Kansei Engineering)

There is no specific definition for the term “Kansei” as it cannot be translated directly. It can be explained as the impression a user gets from an artifact, environment, or situation using all their sense of sight, hearing, feeling, smell, taste

and recognition (Nagamachi, 2010a). Kansei is the psychological feeling of a person. To explain Kansei, the attributes of Kansei that basically made up a person's Kansei are the sense activities, internal factors, psycho-physiological behavioral and responses. It is concerned with the mental function (Harada 1998). Kansei can be described as a process that gathers functions related to sensitivity, emotions, feelings, experience or intuition, as well as interaction between them. A comprehensive description of Kansei can be categorized into Kansei means, Kansei result and Kansei process (Lokman, 2010) .In the perceptive field, Kansei means, which are all the senses that perceive the environment together with other internal body factors, influence one's Kansei. The consequences of Kansei are the Kansei result and it can influenced by the subject behavioral reaction and has influence on the mood, personality, experience or the environment. Kansei process cannot be measured directly because it is the high functions of the brain. What can be observed are not Kansei but the causes and consequences of the Kansei process, it can only be measure partially or indirectly (Nagasawa, 2002).

Kansei engineering can use human's feeling as the tool in prototyping or the other way round. Human's brain can be used as the model to explain Kansei because our brain construct affection, feeling and emotion and they are known as Kansei. The human brain can translate two kinds of information namely Kansei process and Intelligence process. The intelligence process construct Chisei or cognition based on logical information, recognition, knowledge and understanding while the Kansei process construct Kansei through sensibility (Lee et al., 2002). In other word, when a person first looks at a product, the first impression they have over the product is known as Kansei, and Chisei is the logical information concerned with memory, judgement, interpretation and thinking that is able to explain why is the person having a certain Kansei. Normally, our decisions are based on our Kansei on the product. In other words, the processes involved in a human brain can be simpfied as mapping, building, and triggering and generating creativity and knowledge (Linkoping, 2015). Figure 2.2 displayed the Kansei process and figure 2.3 showed the route to reach from human's Kansei into the Kansei product design aspect. In this research, Kansei words are the route that I am concentrating on.

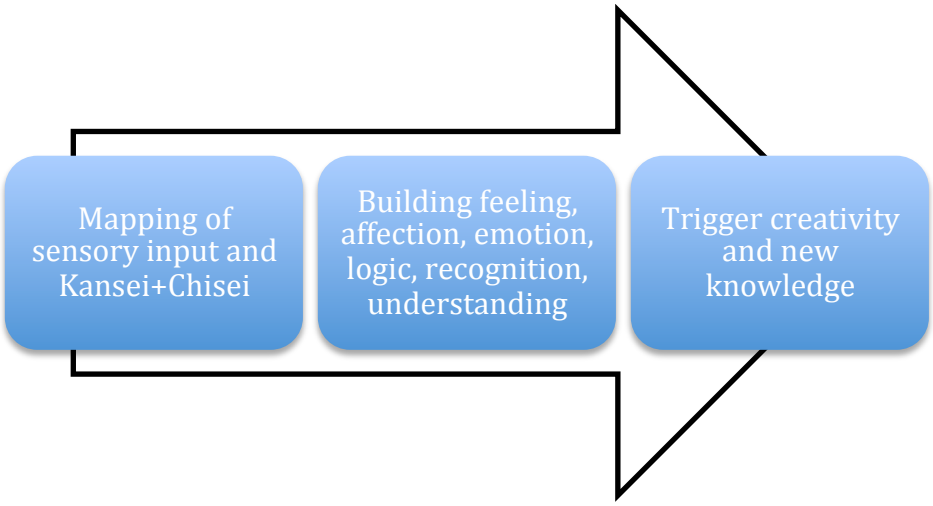


FIGURE 2.2. Kansei processes in human brain

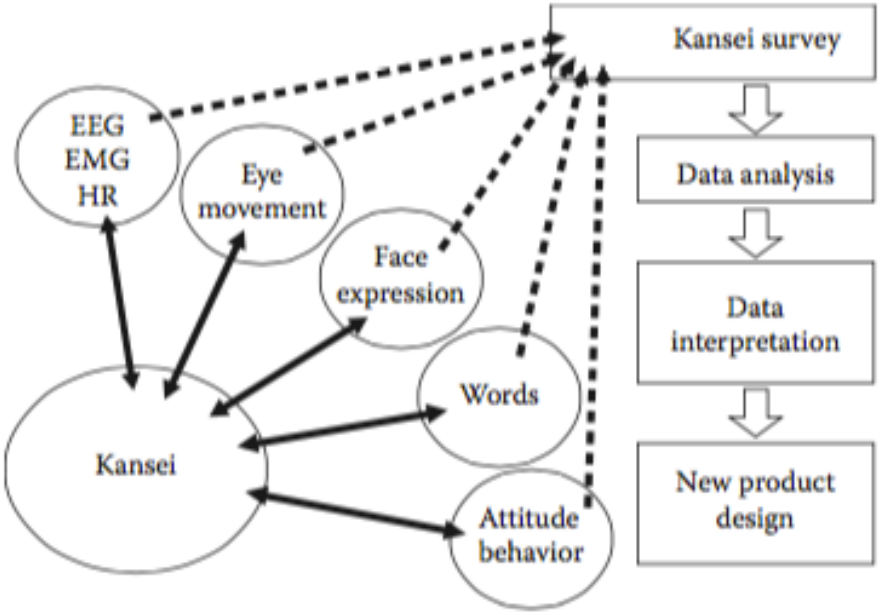


FIGURE 2.3. Route to reach the Kansei and route to reach a Kansei product design

The introduction of Kansei and Kansei engineering in Japan is a significant contribution in the field of affeective science. Affective science is the scientific study of measuring emotion and affect. Affective science and affective engineering are given attention even in the western countries. This can be showed by the development of Affectiva by the Massachusetts Institute of Technology's Media Lab (MIT Media Lab), which is a emotion measurement technology. Computers were trained to recognize human emotions based on facial cues and physiological

responses to help in companies in their branding and advertising efforts(Affectiva, 2015). Based on this, we know that human emotion is crucial in the product marketing fields because many popular brands and companies have already acquired emotion measurment technology in their marketing strategies. Table 4 lists the types of Kansei from Type I to Type VI.

TABLE 2.4. List of Kansei Type I – VI

Kansei Types	Methods
Type I	Category Classification
Type II	Kansei Engineering System (Computer-aided system)
Type III	Kansei Engineering Modelling (Mathematical framework)
Type IV	Hybrid Kansei Engineering (forward and backward reasoning)
Type V	Virtual Kansei Engineering (Combination of Virtual Reality and Kansei Engineering)
Type VI	Collaborative Kansei Engineering System

2.1.5 Types of Kansei Engineering

There are six different methods of Kansei Engineering ranging from Type I to Type VI (Nagamachi, 1999).

Type I: Category Classification

The category classification method is a method that breaks down a targetted kansei category into a tree structure from zero to –nth category to determine the physical design traits. One of the examples of the application of Kansei Engineering Type I is by the Japanese automotive carmaker, Mazda. Mazda utilized this method in the development of a new sports car model "Miata" which the target was the young driver. The project was carried out by recording the operation of a young driver in a

car and examining the picture frames after the recording. After that, card method was used to record the findings. When the project team discovered any hint or suggestion from the picture frames, they noted a keyword on each small card and from the cards; the team gathers the cards into a group whenever they found any cards with the similar concepts or meanings. The figure below showed the arrangement of Kansei concept in tree structure used by Mazda in the development of Miata.

Category Classification Utilized in Miata Development

	Kansei			Physical	Ergonomic	Automotive
Zero	1st	2nd	nth	Traits	Experiment	Engineering
OHM	Tight Feeling			Size	Tight feeling	Chassis design
				Width	experiment	Seat design
	Direct Feeling			Height	Interior Kansei	Interior design
				Seat	experiment	Power train
	Speedy Feeling			Steering	Steering	development
				Shift lever	function test	Steering design
	Communi-cation			Speedometer	Noise frequency	Speedometer
				Open style	analysis	design

FIGURE 2.4. Arrangement of Kansei concept in tree structure (*Adapted from Nagamachi, M. (2010).*)

The zero level categories settled by Mazda was “Machine and Driver as One”, implying the unification feeling between the young driver and the car when he is driving. The project team members then classify the zero-level concept into subconcepts to determine the phsical design trait, and transfer to the ergonomic experiment, the classification continued until the nth level when the team obtained the specfic car design specifications required. Mazda’s project team has succeeded in developing the new sports car; Miata and it became a best seller due to its aesthetic, structural and functional design decided through the emotional oriented research using Kansei Engineering. This method has also applied in the development of shampoo product, brassiere doorknob and other product development.

The process of Kansei Engineering Type I can be represented using the figure below.

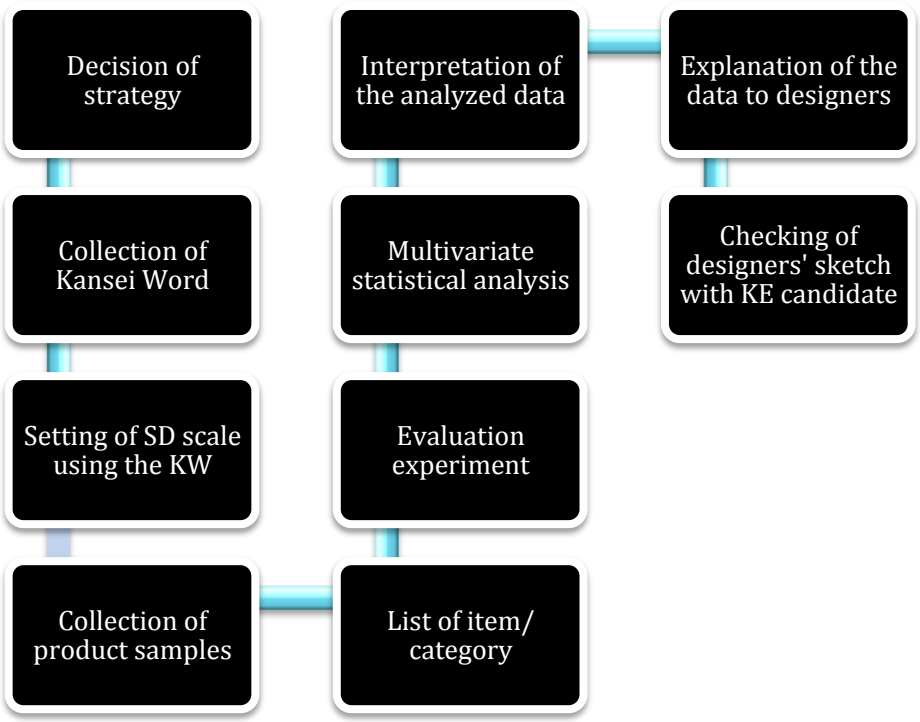


FIGURE 2.5. Process of Kansei Engineering Type I

Type II: Kansei Engineering System (KES)

This method is a computer-aided system with an Expert System that supports the process of translation of customer's impression and image into physical design elements. Four different set of databases are used in the KES. Kansei databases stored the kansei words that are mostly adjectives and sometimes nouns. This KW are normally collected after evaluation has been caried out and analyzed using multivariate analysis such as factor analysis. The evaluation is conducted through Semantic Differential (SD) Method. Image database is the outcome from multiple regresson analysis for qualitative data. The statistical relations between the kansei words and design elements are obtained and the contributory items in the design elements to a specific kansei words can be identified. Knowledge base consist of a group of rules and principles while. Shape and color database stored the design details correlated with each kansei words.

Type III: Kansei Engineering Modelling

A mathematical modelling is used to construct a computerized system in spite of the rule-based system created using Kansei Engineering Type II. Example of application of this method is Sanyo Eletric Co. attempted to implement Kansei Fuzzy Logic as mechanical intelligence in the development of a color printer(Nagamachi, 1999).

Type IV: Hybrid Kansei Engineering

This method used forward and backward engineering method using computerized system in the development. When the developers want to know how much his designs are fit to the kansei, they seek for computerized suggestion using the KES. This is known as backward engineering. Forward engineering are as described in KE Type II. Therefore, the combination of both directions is known as Hybrid Kansei Engineering Method.

Type V: Virtual Kansei Engineering

This method is a new technique that combined Kansei Engineering with Virtual Reality Technology. Using this method, a kansei environment is created and the new product is constructed in the system so that the customers can experience the product in the virtual space. This method is utilized in the development of a kitchen system where the customers evaluate the virtual kitchen with reference to his image in the virtual world. Professor Nagamachi constructed this virtual space using virtual Kansei Engineering method.

2.1.6 Application of Kansei Engineering in Product Development

Product emotion has been recognized as the primary aspect of customer's satisfaction (Norman, 2004) and market success (Nagamachi, 2004). Table below displays the existing KE applications in the industry.

TABLE 2.5. Existing KE application

Organization /products	Method /Technique	Tools	Procedure
Mazda (sports car), Milbon (hair care products)	KE Type I-Category classification, Kansei words classification using semantic differential (SD) scale	Questionnaire survey, Ergonomics experiments, Kansei engnineering system, ARTsss(Neural Network model)	1. Quantitative analysis of survey result 2. Extract keywords and find the zero-level concept, breaking down into sub concepts 3.ergonomics experiments 4. Final design specifications
Nissan (steering wheel)	KE Type IV-Forward and backward engineering method	Hybrid KE system	1.Find candidate steering wheel 2. New idea added 3. New sketch design
Sanyo (color copy machine)	KE Type III-Semantic differential scales, fuzzy logic	KE system, Kansei mathematic model	1.Evaluate attributes using semantic differential scales 2.Apply fuzzy logic 3.Develop an intelligent color copy machine

Matsushita Electric Works and Hiroshima University (kitchen and dining room design)	KE Type V- Virtual reality technology (VIKE)	VIKE consist of KE system virtual system, amd database	1. Customer answers lifestyle questions on the display and inputs their height and the kansei words that they want to be designed 2.KE system proposes a candidate after calculation 3. If the display graphic design is satisfactory, the procedure moves to the virtual space processed by the virtual system
HousMall (whole house design)	KE Type V- VIKE, Kansei words analysis	VIKE consist of main control system, KE system and Virtual reality system	1. inputs family data and lifestyle data in the system 2. system ask which part to start from 3. input kansei words 4. system proposes a candidate house design 5.if approve, move to virtual space
Collaborative designing	KE Type VI- Groupware design system, concurrent engineering	Consist of an intelligent system and kansei database	Designers can use voice and see colleagues' works on the display After receiving company order for product development, designers check the Kansei database and the intelligent system

The table displayed some examples of product development of some organization in the industry that involved or uses Kansei Design method in enhancing the quality of their product. All of the products produced using KE had good sales or has been hit on the market. This proved that Kansei engineering is a powerful ergonomics as a consumer-oriented technology in the new age. Surveying took a very important role in Kansei engineering because it's very important to grasp the customers' feelings at the beginning of product development and therefore the scale of the Kansei words consisting of the semantic differential appropriate adjectives can be prepared prior product development. For my research, interview, questionnaire, survey and informal usability testing will be used to collect data of the customers' feedback towards government website is the most important point to capture the customer feelings before we trying to improve or build a new website.

Based on my study, the application of Kansei Engineering in product design is still fresh and not widely used especially in country other than Japan. Most of the products that adapted this technology are organizations in Japan. These organizations implemented Kansei Engineering in their design process and study has shown that all of these products had hit on the market because they capture and grasp the customer's desire and need. This has proved that applying Kansei Engineering in the product development is viable since all the products produced excellent results.

There are also a few example of applying Kansei Design in e-commerce website such as online gift shop(Goh, Chen, Daud, Sivaji, & Soo, 2013) and online clothing shop (Lokman & Noor, 2006). The first literature serves as the point of departure for my research as the study was initiated by my supervisor and Mr. Ashok from MIMOS. It is an advantage for my study as advice and reference from the previous researchers on the similar topic can easily be obtained. However, according to my study, Kansei Design has not been used in other domains or products mentioned above. Based on my objective and problem statement, my research aims to apply KE concepts in E-government website in order to improve the usability of these website.

2.1.6.1 Examples of product development using KE Method

TABLE 2.6. Product that **used KE in the development**

Product	Description
Cloetta 's Sport lunch wafer 	• A benchmark study was conducted and showed that their chocolate covered wafer products rate much lower for "unhealthy" and "bad conscience" than other products. • 3 Kansei studies with the goal to minimise the impression "unhealthy" and at the same time maximise the impression of "delicious"was conducted. • The final study determined new design for the interios chocolate bar and the exterior packaging.
Car interior of Volvo car corporation 	• To determine product features inside a car that gives people " delight" and passion". • Surprisingly a number of non-tangible features such as "sound" and "smell" ranked high in the key feature identification state. • A method was developed to measure affective impact of generated sound in car interiors.
Stick Mixer at Electrolux 	• Affective engineering methods were used to make a benchmark analysis of the affective impact of stick mixers, to choose and combine product properties in order to achieve a certain emotional profile.
Toyota warehouse reach truck 	• Several studies were carried out: o 1st study: study on how different existing truck model were percieved regarding their affective properties in different European country using KE Type 1. o Several components were identified and improved using KE Type 2. o Confirmation study was conducted after the product launched to show that most of the intended affective properties are improved.
Office chair at Kinnarps AB	• In the development of the company's new

	office chair, the prototypes were evaluated in terms of ergonomics, comfort, usability, quality feeling and user impression.
Refrigerator at Sharp Company 	• The project team visited monitor's house with a camcorder • Pictures of a woman operating the refridgerator were collected. • 70% of the pictures were of the woman bending very frequently to open the lower door. • Ergonomic elements and posture aspect were taken into account. • New refridgerator that placed vegetable drawer on top to promote easy operation was developed in 1979. • The new Kansei refridgerator with several drawers became the Japanese standard.
Sharp Liquid Crystal ViewCam 	• The Kansei team reached a Kansei idea to rotate a lens 350 degree, and to check an image by a liquid crystal mirror behind the camera instantly after taking picture. • The Liquid Crystal ViewCam was developed in 1980. • This design extended to the creation of a digital camera. • This design was selected for the Good Design Award by the Japanese government.

2.1.7Usability Assessment used in e-government website development

Table 2.7. Application of usability assessment in e-Governmnet website development

Authors	Type of usability assessment used
(Sivaji, Abdullah, & Downe, 2011)	Sivaji et al. used Heuristic Evaluation in conducting usability testing in e-government website development.
(Sivaji et al., 2014)	Sivaji et al. used informal Usability testing in conducting usability testing in e-government website development.
(Albayrak & Cagiltay, 2013)	Albayrak et al. performed similar usability studies using eye-tracking method on Turkish e-government website.

Table 2.8. Difference between the usability assessments used in e-Government website development

Heuristic Evaluation	• The focus of HE is normally on finding defects effectively. • The defects found serve as the recommendation for the organization to set a benchmark or HE score for the website to reach a level of acceptance.
Informal Usability Testing	• Feedback from the evaluation are explained in terms of ISO/IEC25010 to utilize as metrics for reference during website development. Example of these terms are efficiency, satisfaction, learnability and etc.
Eye-tracking method	• Evaluation and Assessment on the website are based on heat maps gaze plots in determining the average time user spent on each function or task they carried out in the test.

Based on the tables above, different types of usability tests and the difference of outcomes between one another are showed. These usability tests are common in the HCI field as they have been widely in used. The studies above show the outcomes of applying these methodologies in the e-government website.

Some difference of this research from some previous works is that the usability testing methodology used in this study is not the tradtional usability testing methodologies that have been commonly in used. Kansei engineering methodology is used in this research and it is different from the previous works because it used a different way of evaluation. Kansei Engineering evaluation on a website is based on the users' impression and emotion when they are using the website. Moreoever, the advantage of using this method is that the feelings and impression of users can be quantified to a statistic form by performing statistical analysis on the collected data from the Kansei survey. By applying statistical analysis, the data obtained from the usability tests is more precise and accurate. The statistical figures obtained from the can be used to improve the usability of a certain website and identify the impression of users in Malaysia on the e-government job search website when performing operation using the e-government service. Furthermore, other than testing the usability of an existing website, the collected data can then be translated into a set of design solutions or parameters and developers can utilized these parameters as a framework in their development proess. In a nutshell, the main objective of this research is introduce Kansei Engineering usability testing methodology that is barely new in the HCI field as well as to determine the most appropriate design parameters for the existing website so that modifications can be made based on the Kansei survey results after applying the method. Prototype of a new e-government job-seeking website which provide the best user experience and with high usability value for Malaysians can be developed based on the testing results.

CHAPTER 3

METHODOLOGY

3.1 RESEARCH METHODOLOGY

The methods used in conducting this research are basically research and analysis of existing technology in the same context as the research topic. In other words, the first step of the research is to search for related journals, research papers and articles that might be useful for the project. Background study on the topic to gain overview about the research topic, identifying problem statements, aim of study, and scope of study are done during the initial stage of research.

The next phase of the research is the most vital stage throughout the whole cycle. Studies on the research topic via materials from different sources are conducted in order to study on a few important elements including the concept and operation methods of the current technologies and existing or similar products. After that, comparative studies are conducted to find gaps between the existing products. All the results of study will be included and cited in the literature review. The purpose of literature review is to give an insight to the readers about the results of studies, to learn how previous works have defined and measured key concepts, and to discover what have not been discovered or investigated. The relationship of this research project and the other researches are explained clearly in the literature review.

Through comparative studies and some investigation from the literatures, gaps are identified and the research is proceeding to the next step. Fundamental analysis like literature review is not sufficient for a research study. Technical analysis is conducted in order to get the works validated. Qualitative and quantitative analysis such as usability testing, survey, observation, and interview played an important role in a research project because they generate evidence to prove the validity of the assumptions and concepts. All the data collection conducted during this stage is to prove the problem statement and objectives that are identified during the first stage of the research.

The collected data will then be organized with the help of visual aids in the form of diagrams, tables, graphs and charts. Test data designs, use cases, are produced during this stage of the research. The progress of all the activities conducted will be recorded during this stage. For instance, a survey is designed and conducted with expected results that might be helpful to the research. Nonetheless, the results of the survey did not meet its expectation and did not provide sufficient help for the research. Thus, the survey is considered as a failed evaluation experiment. This part of the study will still be included in the progress report even though it did not meet its expectation because it is a part of the works that are conducted and implemented during the research process. The failed examples can be used as a platform for researchers to discover new knowledge through investigation and analysis on the reason of failures or imperfection. In order words, findings and results of the study will be presented in this part of the research. Lesson learnt report that record the new knowledge gained could also be a part of the results and findings.

Last but not least, the last phase of the research is conducted after all the technical and fundamental studies are completed. The objective of the final phase is to conclude and wrap up the research elements. A summary of all the research efforts, results, methodologies, and process will be written to conclude the research study. Abstract of study that summarize all the phases during the research is also part of the

deliverables when the project is coming to the final phase.

3.2 PARTICIPANTS

Participants in this context represent all the parties or personnel who are going to be involved in the process in this research I am conducting. In this project, one of the participants that I am going to work with is Mr. Ashok, the usability tests administrator from MIMOS Berhad in conducting a few usability tests that are crucial for my research. Other than this, my supervisor Miss Goh Kim Nee and advisor, Miss Mifrah, who is a postgraduate student are also part of the participants in my research because they provide me guidance and advice that contribute a lot in my research.

Participants who will be participating in the tests and data-collecting phase in the research require some early planning. The participants for the usability tests are selected based on a specific age group range. Based on the studies on Internet usage trend in Malaysia, it has been proven that the the age group with the most Internet users are in the 20-24 years old group, followed closely by users who are 25 to 29 years old. The Mi-UX Lab 1.0 UX Research Tool that is hosted on MIMOS cloud was used to gather qualitative and quantitative data from potential end users. The end users comprise of the students from UTP who have accessed the Mi-UXLab 1.0 research tool by answering a Kansei survey form from UTP's infrastructure.

Another group of participants for this research will be the group that will be involve in the data collection process. Participants for survey, interviews and questionnaires will need to be selected prior. Questionnaires will be distributed to the public via various online platforms: social media, email, and blog. Targeted respondents for the survey will be the university students and lectureres as the survey distributed to the online infrastructures users in University Teknologi Petronas.

3.2.1 Justification of selection

There are a few criteria that are use in the process of selection of participants as shown in the table below.

TABLE 3.1. Justification of participants' selection criteria

Criteria	Reason of selection
1. Age	Study focus on participants from specific age group who uses government websites to perform certain operation. Target group of users is from the age group of 20-25 because they are the age group with most Internet users. Reason that can justify the selection is that the university students are highly accessible and therefore ease the participants gathering process.
2. Profession and purpose of usage	The domain that is use for this research is job search websites. This is because our target users are from the age of 20-25 and job search websites are defnitely one of the most used. Students who are seeking for interns opportunities as well as fresh graduates who are looking for jobs are the target group of users.
3. Experience of usage	Study is conducted to experience and non-experienced users based on their familiarity to the websites and thus more diversified data can be collected.
4. Level of knowledge in the usage of online tools	Study is conducted to user who are familiar with using online infrastructures and users who are not good at using online infrastructures. These two types of users have different perspective in viewing the elements of websites and thus data of diversified viewpoints can be collected.

3.3 RESEARCH DESIGN

3.3.1 FYP1 milestones

TABLE 3.2. FYP1 Milestones

Milestone	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Selection of project topic														
Literature search														
Literatures reading														
Submission of logbook														
Data collection														
Design project outcome														
Submission of interim report														

Project works continued														
Proposal defense														

3.3.2 FYP2 Milestones

TABLE 3.3. FYP2 Milestones

Milestones	W 3	W 4	W 5	W 6	W 7	W 8	W9	W 10	W 11	W 12	W 13	W 14	W 15
Start technical work on FYP													
Submission of weekly logbook													
Data and participants collection													
Usability test execution in UTP													
Results collection													
Data analysis													
Final report writing													
Prototype development													
Final prototype ready													
Pre-sedex (evaluation by lecturers)													
Submission of technical paper													
Submission of soft-bound cover report							draft						
Video													

making													
Sedex (exhibition for chosen projects)													
VIVA (presentation to external evaluators)													
Submission of hard-bound cover report													

3.3.3 Gantt Chart for FYP1

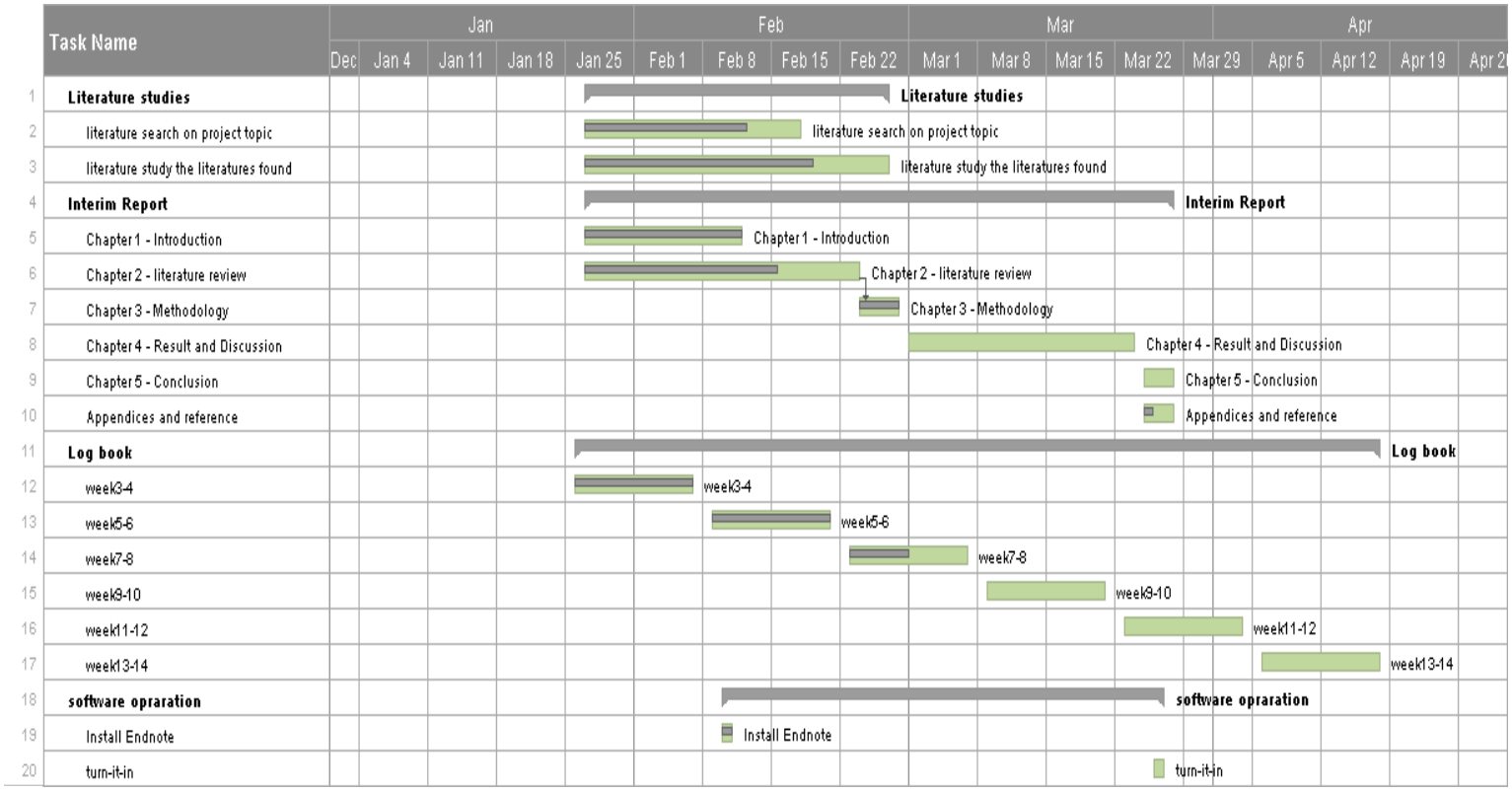


FIGURE3.1. Gantt Chart for FYP1

3.3.4 Gantt Chart for FYP2

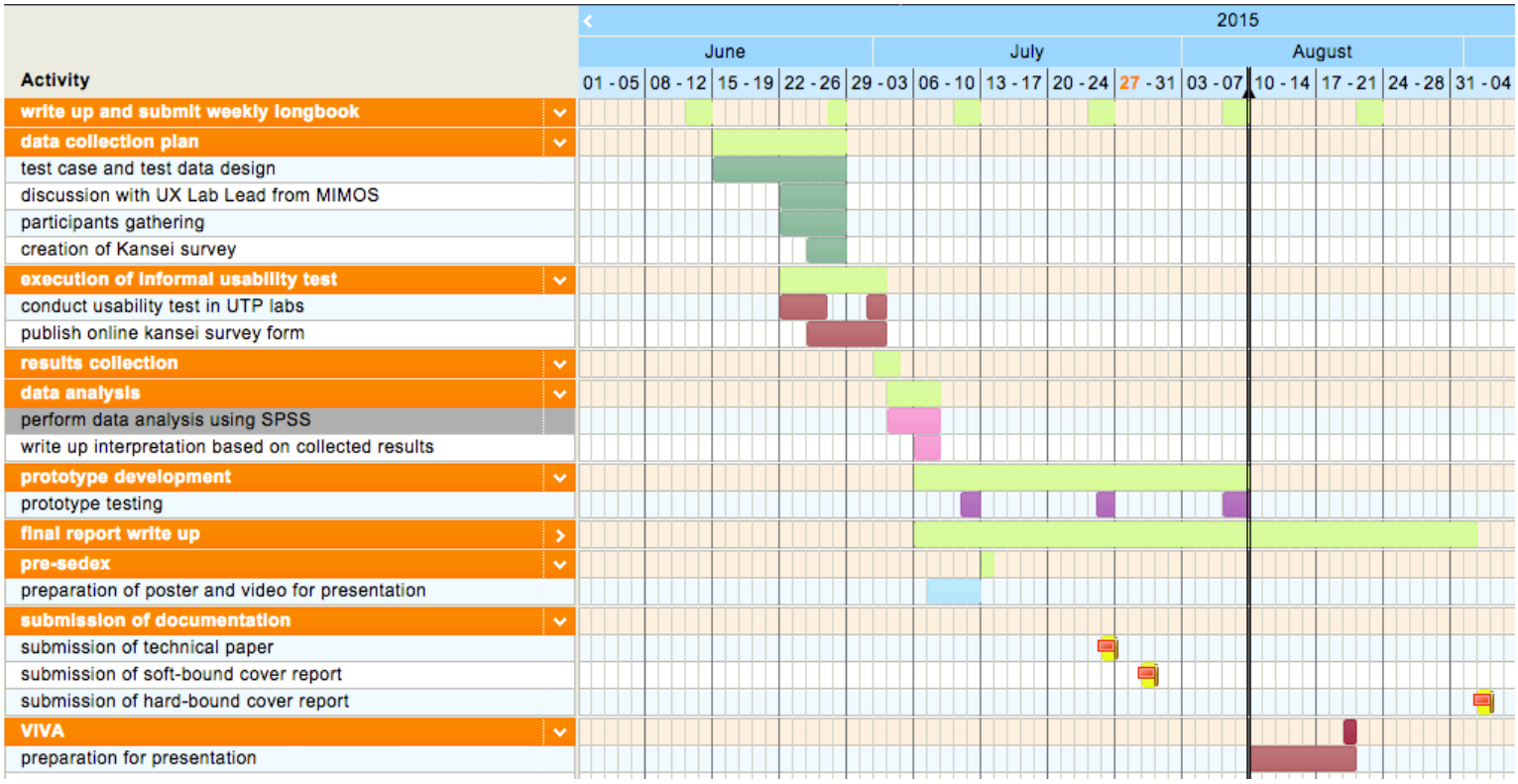


FIGURE3.2. Gantt Chart for FYP2

3.4 DATA COLLECTION PLANS

Qualitative and quantitative analysis are used for data collection. To collect quantitative data, questionnaire on issue regarding the usability of websites and surveys will be conducted to 50 online websites users who may have or have not used government websites to determine the importance of website usability to the general public. Kansei survey is one of the most crucial steps in the data collection process. Kansei survey is conducted by following the methodology that is used when Kansei Engineering Type 1 is used in a development. Kansei words played an important part in the Kansei survey because they are the determinants of the success or failure of the survey. The Semantic Differential Method developed by Osgood is used to quantify the subjective users' emotion and provide an objective measurement of the product's psychological meaning to the users. Methods to apply the SD method will be included in the subsequent topic. Kansei survey is a usability testing methodology that adopted Kansei Engineering methodology and it is conducted and created in collaboration with MIMOS. The professionals from MIMOS Malaysia will help to develop and guide the flow and procedures of Kansei survey using the usability testing tools provided (Mi-UX Lab1.0). The results collected from Kansei survey will be analyzed using the appropriate tools and methods to present the data in the most suitable way.

Qualitative data can be collected through observation, and interview. Observation on the participants of usability testing is one way to collect qualitative data. Interview is conducted with usability engineer from MIMOS to determine the core usability problems in most websites, the domain that facing the stated problems and that the company are concerned of, and to get advice on ways to improve the identified problems.

3.5 OPERATIONAL DEFINITION OF VARIABLES

Variables that will be used in the usability testing are Kansei Engineering and Kansei words that will be use for Kansei labeling and category classification.

Kansei Engineering (KE) is the method to translate the Kansei of users, which are the users' subjective impression to a design. The operation of KE involved a number of steps including determining a domain, structuring a Kansei space in which users' Kansei can be measured and analyzed, and interrelating product details and kansei elements in that particular domain (Schütte, 2005).

The operational definition of Kansei words or Kansei labels are normally adjectives, nouns, verbs or sentence that are collected by asking people to express their Kansei in words upon seeing the products or for products that they want to buy in the future Kansei researchers figured out the method to measure the expressions and the entrance to reach the human Kansei. These Kansei entrance are normally a combination of several getaways (Nagamachi & Lokman, 2010). Kansei labeling based on these collected Kansei words will developed a user model that can classify the user behavior or their need based on their feedbacks or the words they used to describe the website they are accessing. In other words, the result based on the collected data will be use to develop a user behavior model through Kansei Engineering. The results obtained from KE can be used as a guide for development purpose.

3.6 RESULTS OF PILOT STUDIES

Pilot studies on Kansei Engineering is essential as it is important to understand the concept of this framework before proceed to any other further development. The results of pilot studies showed that a small scale Kansei Engineering System is the most feasible method to be applied. Based on my studies, there are some system that are designed in a large scale such as hybrid Kansei engineering system, VIKE that uses virtual reality in the system. These systems are infeasible and take a long time and budget to be implemented. Kansei Engineering type 1 is the most suitable method to be used in the system. Operation of the methodology will be explained

further in the following topic in this chapter.

3.7 PROPOSED ANALYSIS FOR THE DATA

A data analysis method needs to be identified to perform data analysis after data have been collected. There are several analysis methods that had been utilized in the previous Kansei Engineering researches. Multivariate analyses play the main roles in Kansei Engineering(Nagamachi, 2010a). These methods are statistical analyses that are able to represent the results in a statistical way. Examples of statistical analysis methods that can be applied in Kansei Engineering included Principal component analysis (PCA), Factor Analysis, Cluster Analysis, Linear Regression Analysis, and Partial Least Square Regression. The proposed analysis for this project is the Principal Component Analysis that can be used to obtain Kansei Structure and Factor Analysis to find factors among the variables. The reason of choosing Factor analysis over other techniques is that the involved variables in the analysis are playing the equal role. Factor analysis is a method of data reduction used to explain the variability among variables. It also impies the interrelation analysis between variables.

3.8 DEVELOPMENT METHODOLOGY

3.8.1 Selected Kansei Engineering Methodology

Kansei Engineering Type 1 (category classification) is used as the development methodology for this project. The flow of this methodology includes an evaluation survey followed by statistical analysis of the obtained data from the survey. Basically, the process includes three steps. The first step to be carried out is the selection of Kansei words, followed by the Kansei survey, which is a subjective evaluation of users' perceptions of various sample websites in the form of questionnaire that contains the collected Kansei words. The third phase in the project is when statistical analysis of survey results is conducted. The purpose of this statistical analysis is to determine the combination of website properties by

determining the high score among the Kansei words. Based on the results, a guideline for creating emotional interface design is produced and can be utilised in the development of a new product.

3.8.2 Kansei Engineering Process

Kansei Engineering Process can be shown in the figure below.

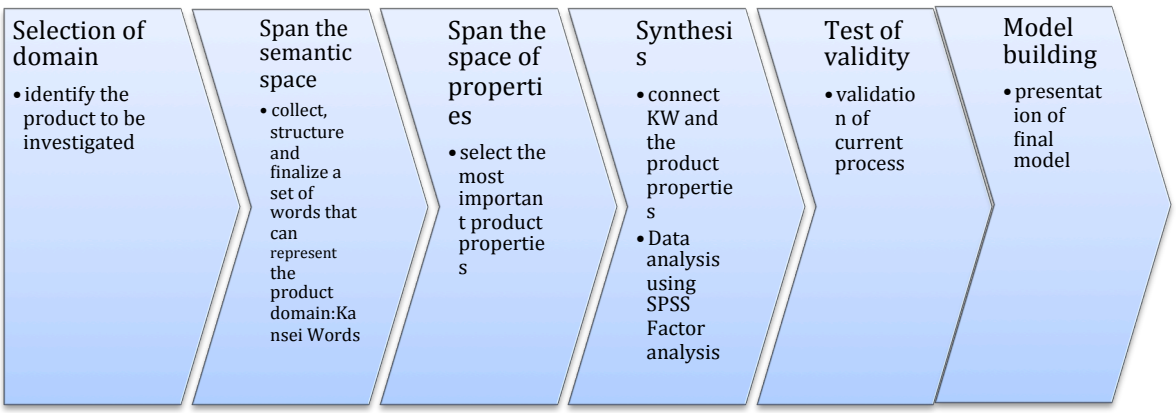


FIGURE 3.3. **Kansei Engineering Process**

3.8.3Kansei measurement process

Kansei is the state of users' intrinsic feelings and their internal sensation. Several methods have been introduced in the Kansei Engineering field. Some examples of these diverse methods included biological signals such as brain waves measurement by electroencephalogram (EEG Signal), muscular activity measurement by electromyography signal (EMG Signal), eye movement tracking, subjective evaluation or self-reporting system such as the usage of different emotional scale, sementic differential (SD) scale or free labeling system. To measure customer's emotion subjectively, adjectives and words that describe the emotional expression have been used.

3.8.4 Semantic differential (SD) scale method

The scaling device used for quantification of subjective users' emotions is the semantic differential method developed by Osgood. This technique provides quantititave support that allows subjective data to be measured objectively. Descriptive scales that contains adjectives or Kansei words that establish the discrepancy degree among various issues are created. The semantic differential scales are normally in the form of 5-7-point scale. In this project, 5-point semantic differential scale was employed. 5-point scale are chosen instead of 7-point scale because users able to express better using a 5-point scale because it is easier to understand than using more points. The data collection and analysis using a 5-point scale is comparably easier too.

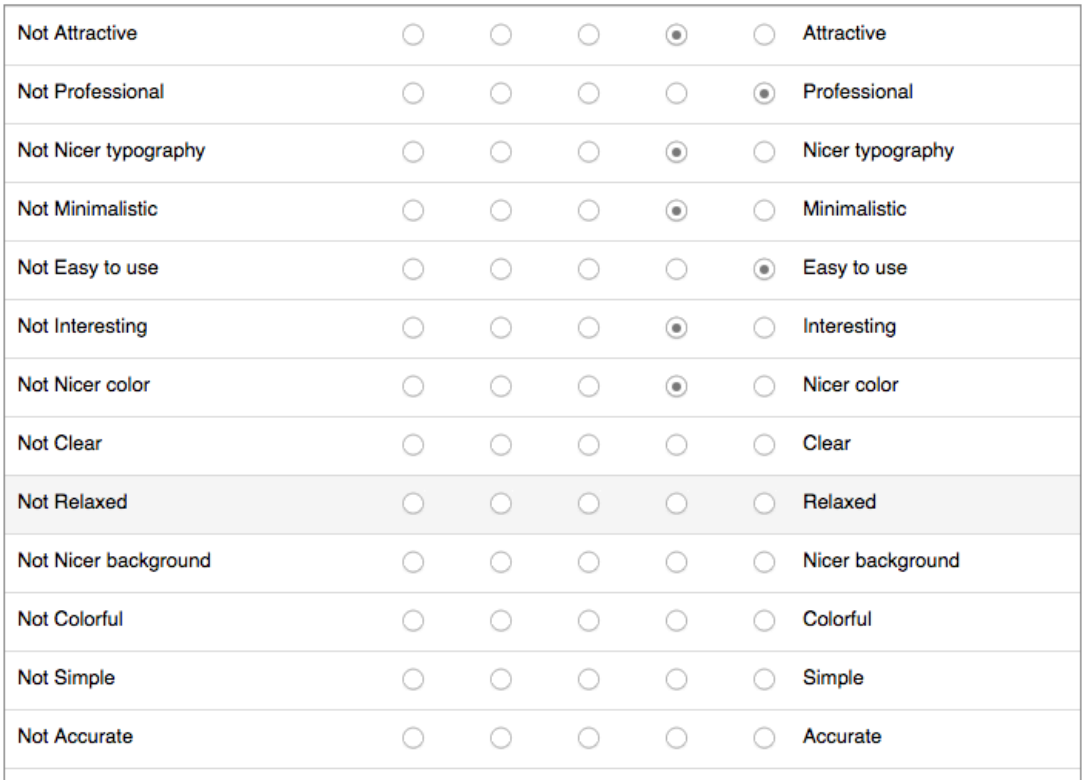


FIGURE 3.4. SD scale of Kansei words

3.8.5 Participants

The surveys were conducted online both remotely and under controlled environment. The surveys are conducted in computer labs in Universiti Teknologi Petronas and the links for the survey were sent to students from other Universities through e-mail.

Students are allowed to do the survey remotely. A total number of 73 people participated in the study. The participants for this survey are made up of university students who are currently in pursuing foundation, undergraduate or postgraduate studies in ages ranging from 19-25 years old.

3.8.6 Test data design

Comparative study has been done to compare among different websites of the same domain. The scope for this sample collection includes private and government organization websites and local and foreign websites. Nonetheless, the websites samples serve the same purpose, which is a job portal for users to search for jobs. The objective of using different websites sample for the evaluation survey is for comparison purpose. Different feeling can be evoked when the users are different websites with different interfaces, functions, designs and other properties.

TABLE 3.4. Selected websites sample for Kansei Survey

Website	Organization	Country
www.jobsbank.gov.sg	Government	Singapore
www.jobsmalaysia.gov.my	Government	Malaysia
www.seek.com.au	Private	Australia
www.monster.com.my	Private	United State

The chosen government website as test models are:

1. Website of Malaysia's Ministry of Human Resources ***www.jobsmalaysia.gov.my***

FIGURE 3.5. Sample website 1

2. Jobs search website authorized by Singapore government ***www.jobsbank.gov.sg***

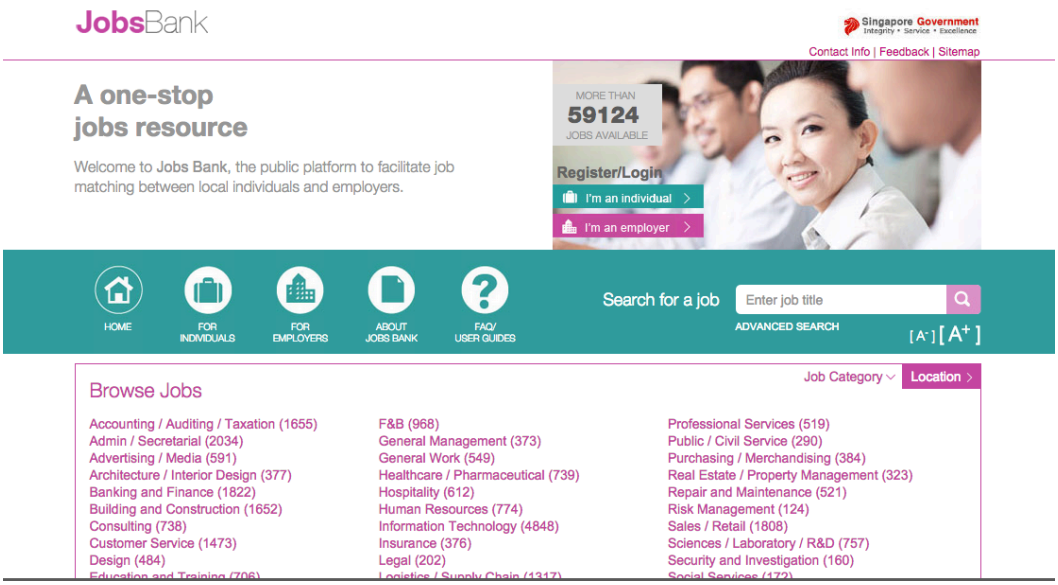


FIGURE 3.6. Sample website 2

3. Jobs search website [private]

www.monster.com.my

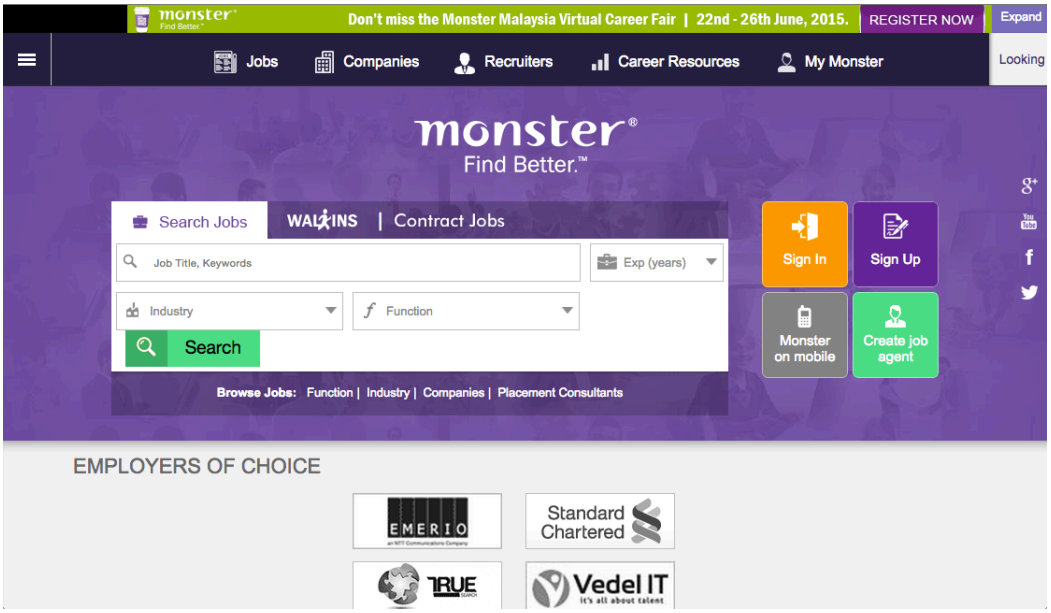


FIGURE 3.7. Sample website 3

4. Australia's popular jobs search website [private]

www.seek.com.au

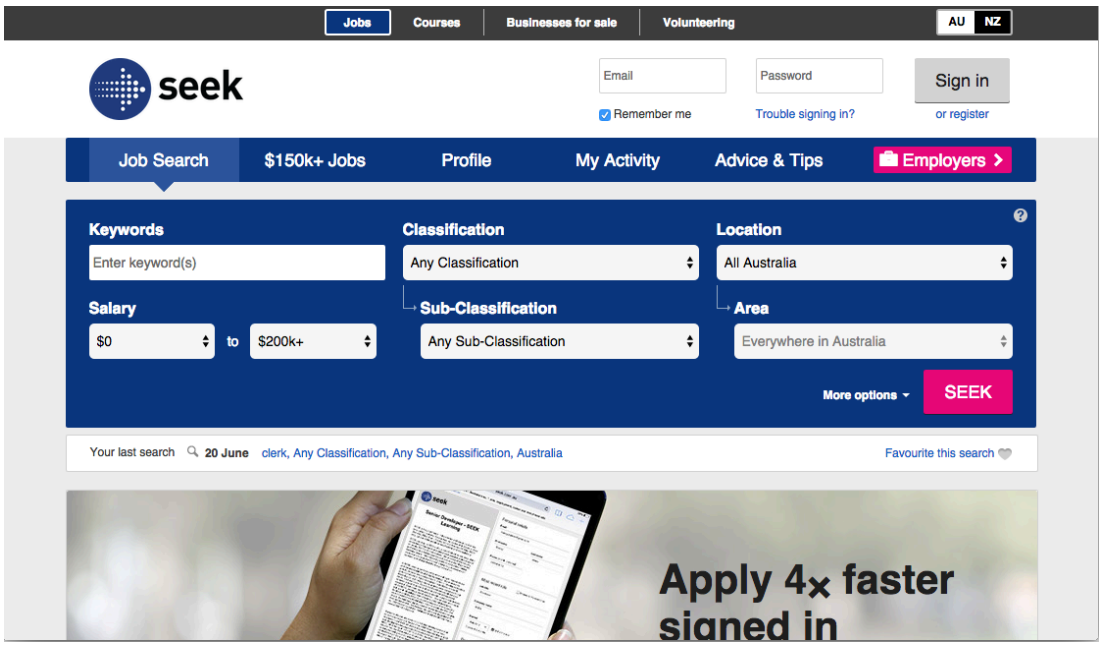


FIGURE3.8. Sample website 4

3.8.7Kansei words design

The collection of Kansei words referred to survey results that have carried out earlier during pre-exploratory stage and examples from previous works. The Kansei words are made up of mostly adjectives and nouns, that able to represent the implicit feelings of user in the most appropriate way. The selected Kansei words can be categorized into four different categories in relation to the website elements. Kansei words that are related to the aesthetic elements in the website are grouped under the same group, the other words are categorized into physical, sensational and operational categories based on their relation with the three attributes. The table below categorized the selected Kansei words into four categories.

TABLE 3.5. Kansei Words categories

Aesthetic	Physical	Sensational	Operational
Attractive/not attractive	Colorful/not colorful	User-friendly/not user-friendly	Responsive/not responsive
Professional/not professional	Simple/not simple	Eye-catching/not eye-catching	Informative/not informative
Nicer typography/not nicer typography	Accurate/not accurate	Concise/ not concise	Higher understandability / not higher understandability
Minimalistic/not minimalistic	Direct/ not direct	Customizable interface/ not customizable interface	Easier to refine search/ not easier to refine search
Easy/not easy	Detailed/ not detailed	Flexible/ not flexible	Useful suggestion and information/ not useful suggestion and information
Interesting/not interesting	Nicer design/ not nicer design	Satisfying/ not satisfying	Accessible for disabled people/ not accessible for disabled people
Nicer color/ not nicer color	Wordy/ not wordy	Interactive/ not interactive	

Clear/ not clear	Well-displayed search bar/ not well-displayed search bar	Nicer placement of objects / not nicer placement of objects
Relaxed/ not relaxed		
Nicer background /not nicer background		

3.8.8 Informal Usability Testing

The tests are conducted using Kansei Engineering Type 1 that operates by the collection of Kansei words. This method can also be known as category classification. The usability tests are conducted in the usability lab in Universiti Teknologi Petronas with the available resources in the lab. The tool used in conducting the test is MI-UXLab Kansei Survey tool. Initial steps before carrying out the usability test is data gathering and participants gathering. To obtain precise results and accurate data, Kansei Engineering Type 1 starts with the zero-level concept, which is broken down into a few sub-concepts. In this project, the test is kickoff by collection of 30 different Kansei words that are related to the products of research. These Kansei words can be any words, mostly made up of adjectives that is able to describe a user's feelings. The collection of Kansei words is done before conducting any usability testing, they can be further divided into 4 sub-categories: aesthetics, physical, sensational and operational. The collected Kansei words will be arranged on a 5-point or 7-point scale. When the data are ready, participants who are going to participate in the survey need to be designed and gathered. Participants with high diversity in terms of their age or background will result in more accurate result. 60 users were sampled from Universiti Teknologi Petronas students and lecturers from different departments and courses. Four websites of the same domain are selected and tested for comparison purpose. These websites are official government websites of Malaysia and other countries or website of private organization that are used for the same intended purpose. The purposes of using different sites are for comparative study as well as benchmarking purpose.

The procedure of the survey is simple; the user is given a limited time to carry out certain task using the site within the time given. The user will do the Kansei survey

after surfing one website. The process will carry on with the same procedure for the remaining websites and each period is timed to make sure the surfing time for each participant is the same. The users will rate their first impression to the website based on a set of Kansei words arranged in the 5-point scale. To avoid the order effect, the websites are arranged in a few sets of sequences to ensure the accuracy of test results. The requirements, design specifications and properties are sorted out by using SPSS factor analysis method to reduce the data into a set of figures and graphs. The analyzed data are interpreted from the perspective of Kansei Engineering, to find the relationship between human Kansei and product properties. When the testing stage is over, the results of the tests will then be implemented in the creating and development of product design. Prototypes of government website will be designed based on the results of Kansei Engineering.

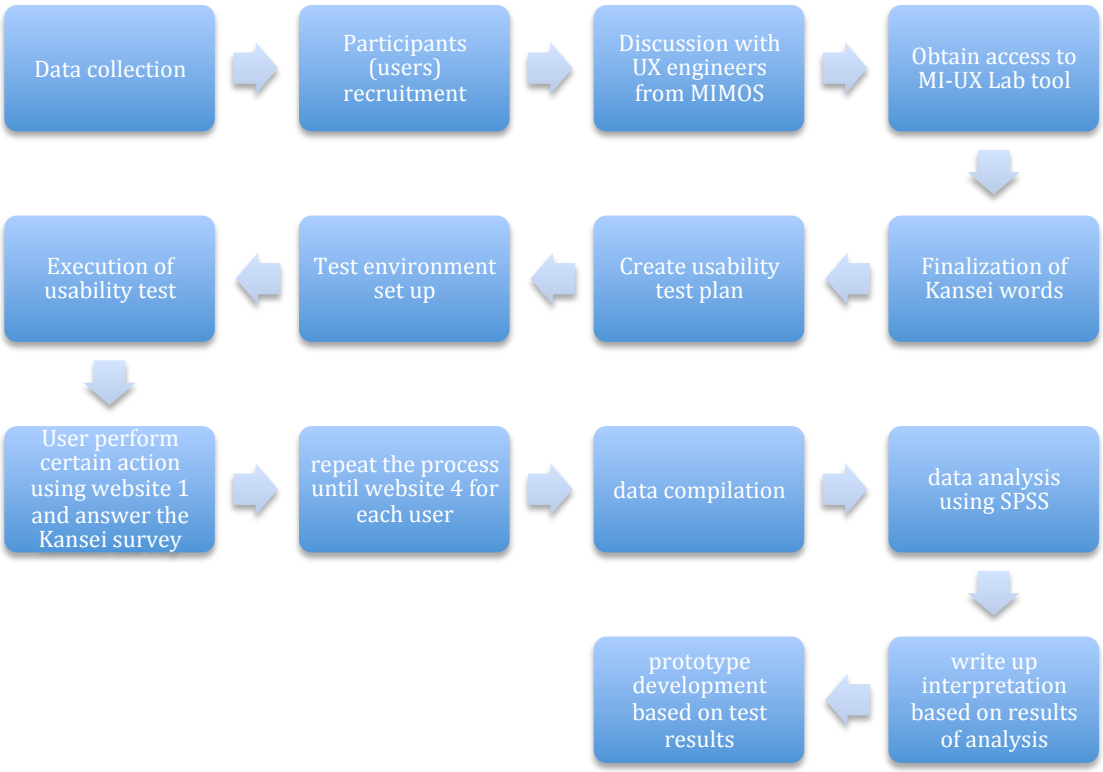


FIGURE 3.9. Process of Usability Testing

3.8.9 Test case design

The users who are going to participate in the test will have to carry out a set of tasks within the time limit of 5 minutes for each website. Therefore, the total time needed for the users to complete the usability test is approximately 20 minutes.

3.8.9.1 Scenario design

The users are given a senario and were asked to carry out simple tasks before answering the Kansei survey form containing 32 Kansei words arranged in semantic differential scales. The scenario given is as below:

You are a final year student, who is going to graduate in 3 months time and you're starting to look for job that you are interested in so that you can start your working life after you have graduated from UTP.

You are now searching a job from the job search website you have browsed. Search for the job you desire by typing in the search bar or select from the browse bar, filter or customize based on your preference. (e.g.:software engineer, materials engineer, petroleum geologist etc.)

Based on the search result, filter the result by refining your search result at your preference if such functions available. (e.g.: search for job with salary RM2000-3000, specific location)

Click into the link if there is any job title/vacancy that you're interested in.
Read the vacancy details.

CHAPTER 4

RESULTS AND FINDINGS

4.1 SURVEY

The purpose of conducting survey is to obtain input that can be use for validation and verification purpose.

Survey 1: How websites usability affects you?

Question 3: Rate the importance of the following website elements to you.

- Simple and nice interface design
- High understandability/usability
- Informative
- High security/ reliability
- Up-to-date information
- High accessibility (low error occurance)

Results:

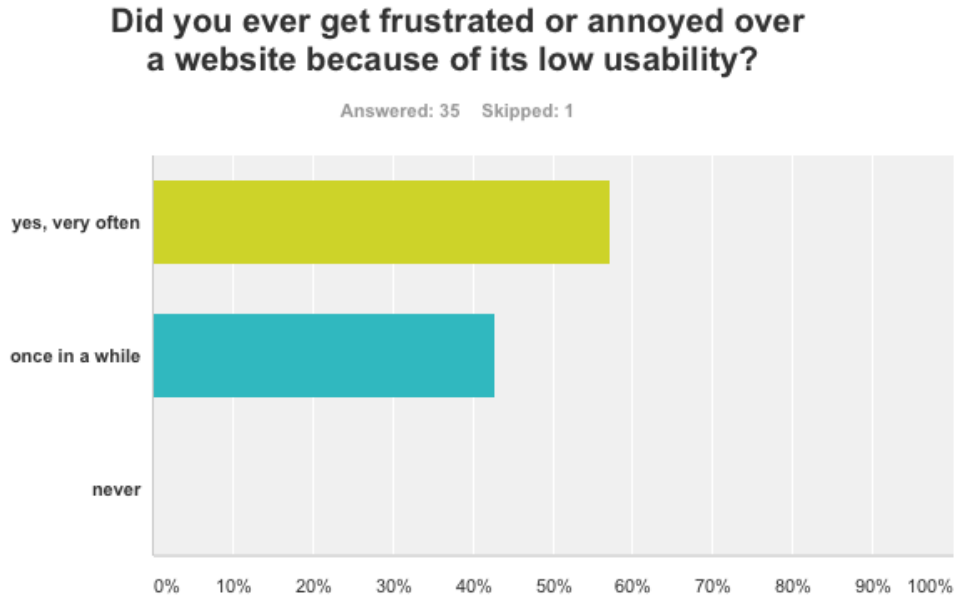
	not really important	slightly important	quite important	important	very important	Total Respondents
high security / reliability	0.00% 0	0.00% 0	8.57% 3	17.14% 6	74.29% 26	35
up to date information	0.00% 0	0.00% 0	0.00% 0	25.71% 9	74.29% 26	35
high Understandability / usability	2.78% 1	2.78% 1	2.78% 1	25.00% 9	66.67% 24	36
Informative	0.00% 0	0.00% 0	5.71% 2	28.57% 10	65.71% 23	35
high accessibility (low error occurrence)	0.00% 0	0.00% 0	5.71% 2	28.57% 10	65.71% 23	35
simple and nice Interface design	0.00% 0	5.71% 2	20.00% 7	34.29% 12	40.00% 14	35

Interpretation:

When users are asked about the web elements that appear to be the most important to them, most users think that a website with high reliability and up to date information are most important to them. The usability and understandability of the website is also comparably more important than criteria like informative or high accessibility. Most of the users think that interface design is not so important to them. In short, users' requirements for websites is a trusted website with high usability and accessibility, better with well-designed interface.

Question 4: Did you ever get frustrated or annoyed over a website because of it low usability?

Result:



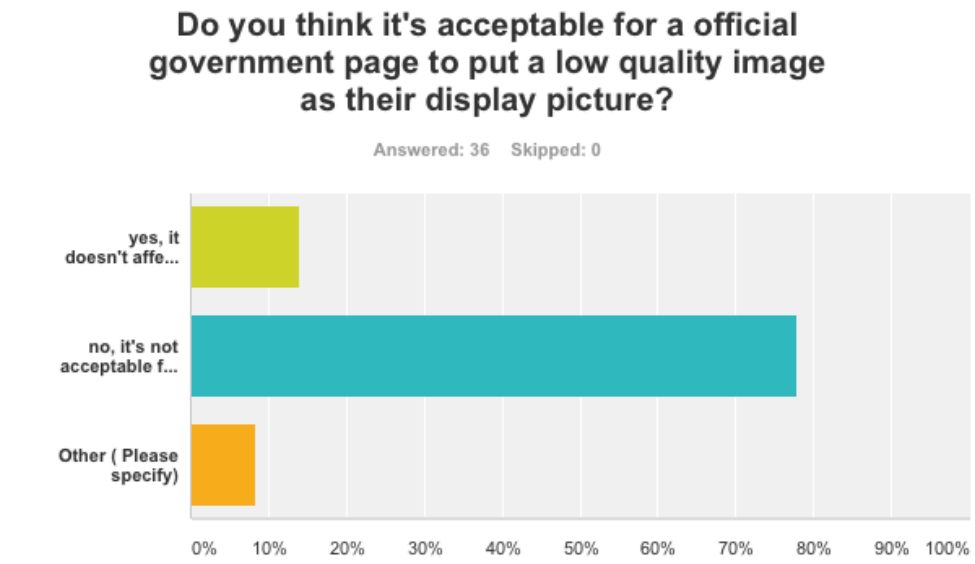
Answer Choices	Responses	
yes, very often	57.14%	20
once in a while	42.86%	15
never	0.00%	0
Total		35

Interpretation:

Most of the users experience low usability websites that causes emotional frustration to them. None of the responders responded that they never get frustrated over website usability before.

Q6: Do you think it's acceptable for a official government page to put a low quality image as their display picture?

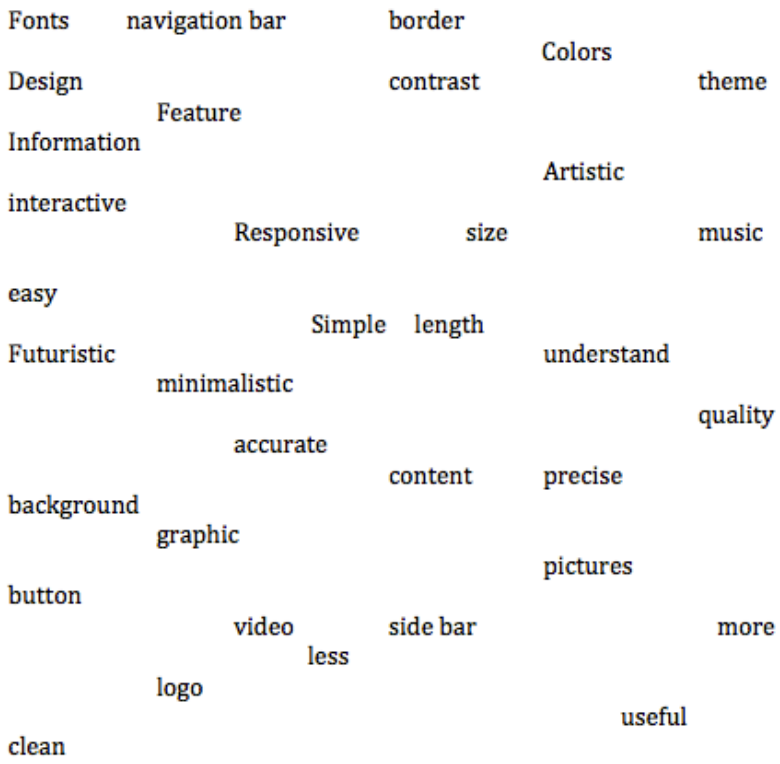
Results:



Answer Choices		Responses	
yes, it doesn't affect anything as long as the information provide are useful		13.89%	5
no, it's not acceptable for me		77.78%	28
Other (Please specify)	Responses	8.33%	3
Total			36

Interpretation:

77.78% Of the responders think that it's not acceptable for them that an official government site to use a low resolution/quality image as their display picture.

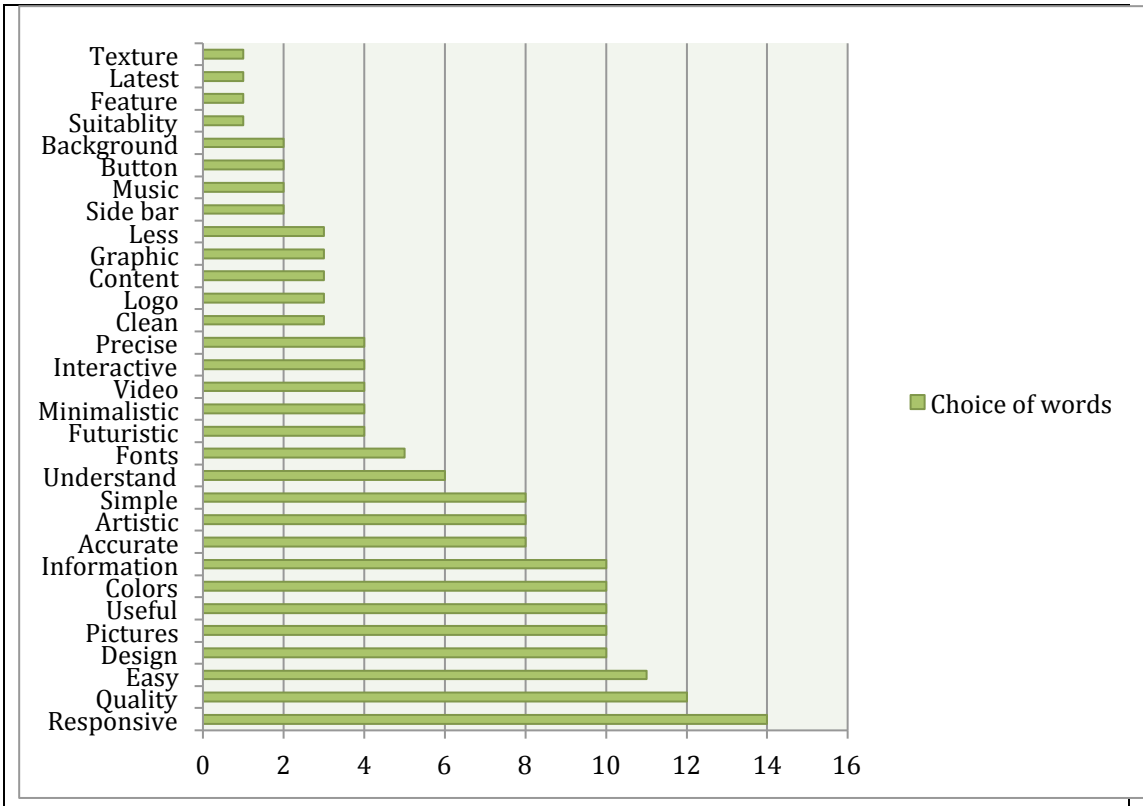


Question 7: Referring to the words above, choose the first five words that pop into your head that you think that they can evoke your emotions the most.

Results:

Words	Users' selection frequency
Design	**10**
Quality	**12**
Futuristic	**4**
Sidebar	**2**
Minimalistic	**4**
responsive	**14**
accurate	**8**
useful	**8**
artistic	**11**

Simple	**5**
Easy	**3**
Font	**1**
Clean	**4**
Suitability	**3**
Video	**10**
Logo	**1**
Pictures	**10**
Feature	**10**
Colors	**6**
Information	**3**
Understand	**3**
Content	**2**
Graphic	**2**
Music	**4**
Button	**3**
Interactive	**1**
Less	**4**
Latest	**1**
Precise	**2**
Background	**2**
Texture	**1**
more	**0**
border	**0**
contrast	**0**
Navigation bar	**0**
theme	**0**
length	**0**
size	**0**



Interpretation:

The results has shown that the top choices of words from the users are responsive, quality, easy, design, pictures, useful, colors and information.

4.2 PARTICIPANTS OBSERVATION

Observation of users' movement and emotions when using the government websites while conducting the usability tests to:

- Identify and guide relationships with participants
- Help the researcher to feel and observe the participants' behavior using five senses

- Help the researcher to be known to the participants, and hence easier to facilitate the research process
- Help the researcher to understand the process that the participants are undergoing

4.3 INFORMAL USABILITY TESTING

Results from usability tests are the key in prototype designs. Expected elements in the prototype include changes in the aesthetic elements of the existing websites. Improvements are made based on the tests results using Kansei Engineering Method. The prototypes are expected to achieve a higher usability value than the existing websites.

4.3.1 Data Analysis

Several types of data analysis methods can be done based on the data collected from Kansei survey. These analysis played important role in the process of Kansei Engineering. These data often have multidimensional characteristics because Kansei is multidimensional(Nagamachi, 2010d).There are several types of statistical analysis that are developed to use in Kansei studies including variance analysis, linear regression analysis. The flow of data analysis usually starts off with Principal component analysis (PCA) or factor analysis that is used to obtain the Kansei structures. The purpose of data analysis is to synthesis statistical data with the product properties and therefore to be applied in the design context. In order to study the factors among the observed variables and how these variables can be grouped, Factor analysis out of other analysis method is used to reduce number of variables and group similar characteristics together. In a factor analysis, all the variables are having the same role. The final results of this statistical analysis are groups of responses with common meaning, reducing and filtering the number of required indicators to explain all the survey responses.

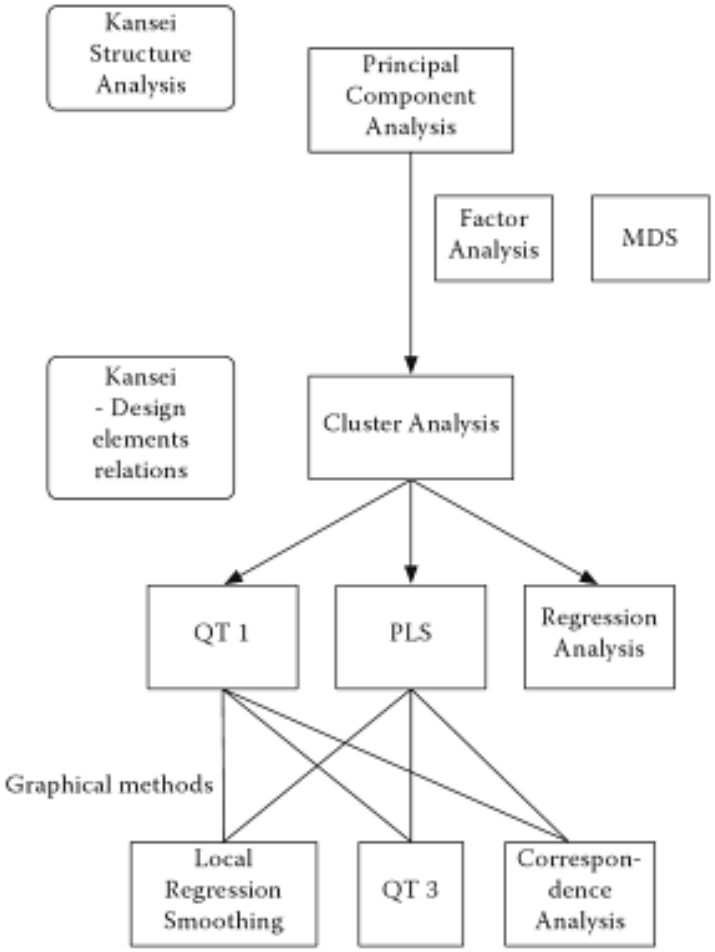


FIGURE 4.1. Scheme of Kansei evaluation data analysis with multivariate analysis data technique

4.3.2 Interpretation of data output

The results from the survey are organized in a spreadsheet. There are three different surveys using the same sample websites in different order. The results from the three surveys that has completed by different users are collected and complied. The data analysis process is carried out by SPSS factor analysis, a statistical factor analysis method. The factor analysis process can be separated into three stages. The first stage is to generate correlation matrix for all variables to determine the correlation between the variables. The second stage of the analysis is to extract factors based on the correlation coefficients of the variable and lastly, the data are rotated in order to

maximize the relationship between the variables.

4.3.3 Preliminary analysis

One of the outputs from the SPSS analysis is the correlation matrix. This matrix can be used to check the patterns of relationship between each variable. The two data that we can look into are the correlation coefficients of each variable to the others and the one-tailed significance of these coefficients.

The colleration coefficient can be used to determine the type of rotation to be used in determining the factors for this set of data. There are two types of rotations that can be performed using SPSS. Oblique rotation methods assume the factors in the analysis are collerated while orthogonal rotation method assumes that factors in the analysis assume that the factors are uncorrelated. There are five types of rotation method that can be selected in SPSS: varimax, direct oblimin, quartimax, equamax and promax. Varimax is the most common orthogonal method to be chosen while direct oblimin is normally chosen when the data are assumed to be correlated. Tabachnick and Fiddell (2007) stated that the best way to beside between orthogonal and oblique method is to request for oblique method with desired number of factors and look at the correlations among the factors. The solutions remain orthogonal if it's able to determine that the factor correlation is not driven by the data. The way to determine this is by looking at the correlation matrix for correlations around .32 and above. If the correlation exceed .32, then there is 10% or more overlap in variance among the factors, and this determine that there're enough variance to warrant oblique rotation to be used for the set of data. Based on the correlation matrix of the data, most of the correlation coeffient exceeded 0.32 and it's obvious that the readings are actually very high.
This indicates that the data are actually correlated and oblique rotation method should be chosen.

The significance value at the bottom of the correlation matrix are scaned to look for

variable that has values that are majority greater than 0.05. The correlation coefficient at the top of the matrix is used to look for value that are greater than 0.9. If any of the mentioned value are found, there might be a chance that problem might arise because of singularity in the data.

4.3.4 Reability Analysis

Realibility of data is analyzed by obtaining the reliability coefficient from the survey data. A reliable result with a high value of reliability coefficient means the survey is consistent and stable even in different duration. Consistency of the data is determined using the Cronbach's alpha value. The realibility analysis yields overal Cronbach's alpha value of 0.979, which is higher than the common benchmark value of 0.7. The realibility of the data is confirmed.

TABLE 4.1. Reliability Statistic

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.979	.979	32

4.3.5 Kaiser-Meyer-Olkin and Barlett's test

The purpose of the KMO and Barlett's test is to determine whether the exploratory factor analysis is an appropriate analysis method for the data. The KMO test measures the sample adequacy while Bartlett's test determines the sphericity. The value of KMO statistic was 0.971, indicating that the sample size of 73 is suitable for factor analysis. The reading for KMO measure varies between 0 and 1. A value of 0 indicating diffusion in the pattern of collerations and therefore factor analysis is inappropriate when the value is 0 whereas value 1 shows that the patterns

of colleration are relatively compact which means using factor analysis can yield distinct and reliable factors. Kaiser (1974) suggests that values more than 0.5 are acceptable and values that fall above 0.9 are superb. The value 0.971 confirmed that factor analysis is a suitable method to be used in this case.

Barlett's test is significant when the value is less than 0.05. A significant test indicates that R-matrix is not an identity matrix and thus there are relationships exist between the variables in this analysis. For these data, Barlett's test is highly significant ($p<0.001$), and therefore factor analysis is appropriate.

TABLE 4.2. Result of KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.971
Bartlett's Test of Sphericity	Approx. Chi-Square	9825.166
	df	496
	Sig.	.000

4.3.6 Factor Extraction

The main objective of using factor analysis is to find the psychological structure of Kansei space. Looking at the total variance explained table, it listed the eigenvalue associated with each linear component before extraction and after rotation. Before extraction, SPSS has identified 32 linear components (factors) within the data set. The eigenvalues associated with each factor represent the variance of that particular linear component. The percentage of variance in the table explained that the first few factors are having a very large amounts of variance especially factor 1 whereas the subsequent factors explained only small amounts of variance. SPSS performed extraction by extracting the component with eigenvalue greater than 1, which leaves us four factors. The eigenvalues associated with the factors are then display at the subsequent column. The table is blank after the fourth column because the

eigenvalues of these components exceeded 1. This column is labelled as Extraction Sum of Squared Loadings. The final column in the table displayed the Rotation Sums of Squared Loadings, which are the eigenvalues after rotation are performed. Rotation has the effect of optimizing the factor structure and one equalizing the importance of the four extracted factors.

TABLE 4.3. Result of Factor Extraction

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	20.058	62.681	62.681	20.058	62.681	62.681	9.646	30.145	30.145
2	1.412	4.413	67.094	1.412	4.413	67.094	9.172	28.663	58.808
3	1.254	3.918	71.012	1.254	3.918	71.012	3.745	11.702	70.510
4	1.177	3.679	74.691	1.177	3.679	74.691	1.338	4.181	74.691
5	.724	2.262	76.952						
6	.597	1.866	78.818						
7	.576	1.801	80.619						
8	.509	1.590	82.209						
9	.488	1.526	83.735						
10	.412	1.289	85.024						
11	.381	1.191	86.215						
12	.359	1.123	87.338						
13	.345	1.079	88.417						
14	.322	1.006	89.423						
15	.301	.940	90.363						
16	.292	.912	91.275						
17	.258	.806	92.081						
18	.249	.779	92.860						
19	.237	.742	93.602						
20	.229	.717	94.319						
21	.217	.678	94.997						

22	.205	.641	95.638						
23	.186	.581	96.219						
24	.174	.545	96.764						
25	.172	.536	97.300						
26	.162	.508	97.808						
27	.150	.468	98.275						
28	.127	.397	98.673						
29	.116	.364	99.036						
30	.116	.361	99.398						
31	.099	.309	99.707						
32	.094	.293	100.000						
Extraction Method: Principal Component Analysis.									

From the Total Variance Explained table, it is evident that the first factor explains 62.681% of the data. In other words, the first factor contribute the most and have the most dominant effect on Kansei words. The first factor represents 62.681% of the variability while the four factors explain 74.691% of the variability. It can be concluded that the first four factors could explain and represent most of the data. The porportion of variability starting from the fifth factor is minimal and insignificant. Therefore, they are eliminated as one of the factors.

The following SPSS output shows the table of communalities before and after extraction. The initial communalities are 1.0 because Principal component analysis (PCA) assumes that all initial variances are common. The column Extraction in the table reflects the common variance in the data structure. After extraction, some of the factors are discarded. The amount of variance in each variable that can be explained by the retained factors is represented by the communalities after extraction.

TABLE 4.4. Communalities after extraction

Communalities

	Initial	Extraction
Not Attractive-Attractive	1.000	.814
Not Professional-Professional	1.000	.783

Not Nicer typography-Nicer typography	1.000	.745
Not Minimalistic-Minimalistic	1.000	.676
Not Easy to use-Easy to use	1.000	.718
Not Interesting-Interesting	1.000	.793
Not Nicer color-Nicer color	1.000	.813
Not Clear-Clear	1.000	.732
Not Relaxed-Relaxed	1.000	.759
Not Nicer background-Nicer background	1.000	.817
Not Colorful-Colorful	1.000	.624
Not Simple-Simple	1.000	.696
Not Accurate-Accurate	1.000	.723
Not Direct-Direct	1.000	.769
Not Detailed-Detailed	1.000	.727
Not Nicer design-Nicer design	1.000	.783
Not Wordy-Wordy	1.000	.807
Not Well-displayed search bar-Well-displayed search bar	1.000	.674
Not User-friendly-User-friendly	1.000	.735
Not Eye-catching-Eye-catching	1.000	.709
Not Concise-Concise	1.000	.706
Not Customizable interface-Customizable interface	1.000	.741
Not Accessible for Disabled People-Accessible for Disabled People	1.000	.738
Not Flexible-Flexible	1.000	.788
Not Satisfying-Satisfying	1.000	.785
Not Interactive-Interactive	1.000	.728
Not Nicer placement of objects-Nicer placement of objects	1.000	.746
Not Responsive-Responsive	1.000	.732
Not Informative-Informative	1.000	.781

Not Higher understandability-Higher understandability	1.000	.818
Not Easy to refine search-Easy to refine search	1.000	.702
Not Useful suggestion and information-Useful suggestion and information	1.000	.739

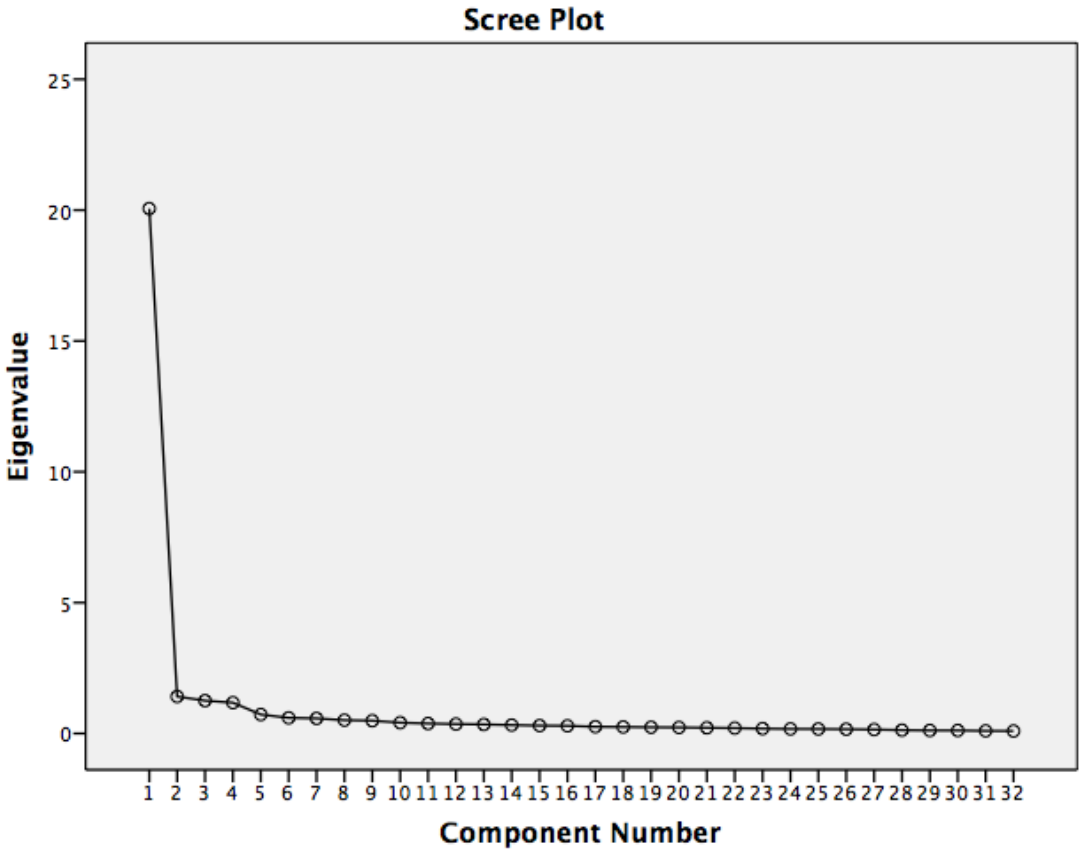


FIGURE 4.2. Scree Plot

4.3.6.1 Scree Plot

At this stage, we know that four factors have already extracted from the data set based on the total variance explained table. The aim of using factor analysis is that it is a exploratory tool and therefore, it should be used as a guideline to make various decisions. One of the important decisions that can be made is to determine the number of factors to extract. The scree plot is a useful tool to determine the number of factors to be extracted. The precise way to determine the number of factors is by indicating the point of inflextion of the curve. The curve begins to tail off after four factors before a stable plateau is reached. Therefore, we could justify that four factors can be extracted from the extraction results.

4.3.7 Factor Rotation

The purpose of rotation is to reduce the number factors on which the variables under investigation have high loadings. It makes the data interpretation easier.

TABLE 4.5. Component (Factor) Matrix

Rotated Component Matrix[a]				
	Component			
	1	2	3	4
Not Informative-Informative	.824			
Not Higher understandability-Higher understandability	.807			
Not Responsive-Responsive	.765			
Not Useful suggestion and information-Useful suggestion and information	.736			
Not Direct-Direct	.732			
Not Accurate-Accurate	.698			
Not Detailed-Detailed	.685			
Not Easy to refine search-Easy to refine search	.666			
Not Satisfying-Satisfying	.646			
Not Clear-Clear	.634	.538		
Not User-friendly-User-friendly	.632			
Not Easy to use-Easy to use	.608	.551		
Not Nicer placement of objects-Nicer placement of objects	.597	.543		
Not Concise-Concise	.592			
Not Interactive-Interactive	.520	.514		
Not Nicer color-Nicer color		.827		
Not Nicer background-Nicer background		.789		

Not Attractive-Attractive		.788		
Not Interesting-Interesting		.767		
Not Nicer design-Nicer design		.736		
Not Nicer typography-Nicer typography		.718		
Not Minimalistic-Minimalistic		.684		
Not Relaxed-Relaxed		.661		
Not Professional-Professional	.590	.627		
Not Eye-catching-Eye-catching		.602		
Not Well-displayed search bar-Well-displayed search bar	.532	.556		
Not Simple-Simple	.529	.539		
Not Colorful-Colorful		.533		
Not Accessible for Disabled People-Accessible for Disabled People			.829	
Not Customizable interface-Customizable interface			.730	
Not Flexible-Flexible			.639	
Not Wordy-Wordy				.888
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 6 iterations.				

4.3.7.1 Interpretation based on Rotated Component (Factor) Matrix

Based on the analysis results, the structure of Kansei Words can be observed through the pattern. From the rotated component matrix, there are a total number of 4 factors after conducting the factor extraction and rotation in the factor analysis.

The factors and the Kansei words falls in their respective group can be presented using the table below. The factor loading for each variable are sorted in ascending order.

TABLE 4.6. Rotated factor and the respective Kansei words based on factor loadings

Factor 1	Factor 2	Factor 3	Factor 4
Informative	Nice color	Assessibility for disabled people	Wordy
Understandability	Nice background	Customizable interface	
Responsive	Attractive	Flexible	
Useful suggestion & Information	Interesting		
Direct	Nice design		
Accurate	Nice typography		
Detailed	Minimalistic		
Easy to refine search	Relaxed		
Satisfying	Professional		
Clear	Eye-catching		
User-friendly	Well-displayed search bar		
Easy to use	Simple		
Nicer placement of objects	Colorful		

Concise	Clear
Interactive	Easy to use
Professional	Nice placement of objects
Well-displayed search bar	Interactive
Simple	

Based on the computed results, the first factor consists of mostly Kansei words from the operational sector. The Kansei space for this factor could be represented as “Physical” and “Operational” feeling. The Kansei words with the highest factor loading are informative, understandability, responsive, useful suggestion and direct with loadings as high as 0.824. Based on the results, factor 1 can be given a new name as “ Straightforward and unambigious”. The second factor consists of mostly adjectives for the design of the website such as colors, typography, background, design. There are also some adjectives that explain their feeling about the website such as eye-catching, relaxed, minimalistic. The Kansei space could be represented as “aesthetic” and “sensational” feeling. The Kansei words with the highest factor loading are nice color, nice background,attractive, interesting and nice design with the highest loading of 0.827 for nice color. Therefore, the factor can be renamed as “High Artistical value”. The third factor consists of adjective that describe the flexibility of the website and could be represented as “Flexible” kansei space. This factor can rename as “high flexibility”. Lastly, the last factor in the Kansei space is the context of the website. A website which contains too many words is affective to a user’s feelings, and could represent as “wordy” Kansei space. These factors represent 74.691% of the total data.
Nonetheless, the fourth factor that made up of only one Kansei word is inadequate to be categorized as a factor. The results demostrate that these four websites samples are structured by three core factors: straightforward and unambigious, artistical value and flexibility.

Results from the data analysis have shown that it is possible to have a design framework that contains the design solutions with quantifiable statistic figure that

can predict users' impression and feelings in the product development process. The survey that has been carried out also proved that this mechanism can be applied in the website development field to provide a detailed checklist that can direct websites developers to achieve better enhancement or development. Using Kansei Engineering, a data-driven design method, an emotional design that is developed based on the predicted users' feeling towards it can definitely satisfy every human being because it focuses on human behavior and their feelings.

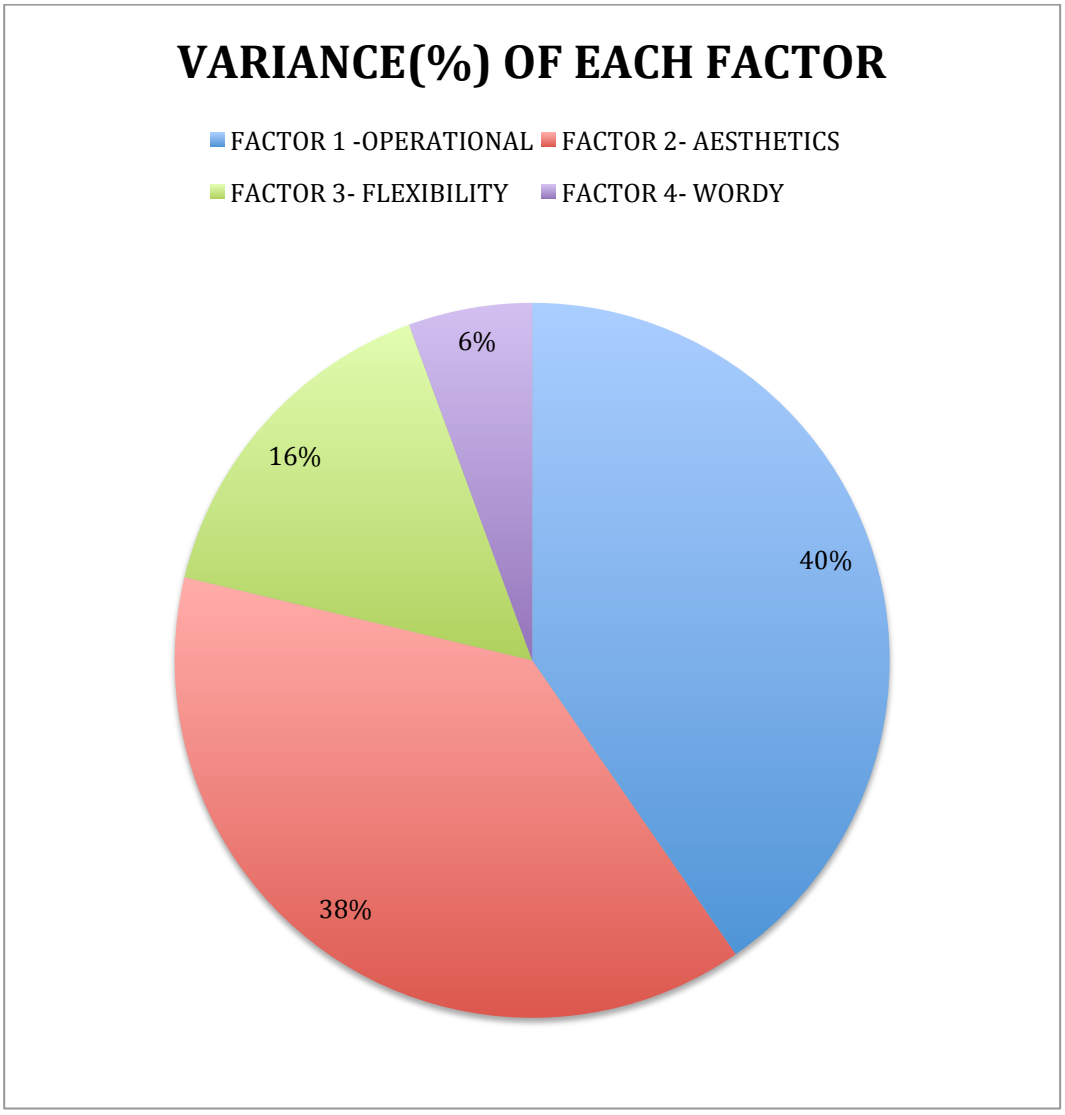


FIGURE 4.3. Percentage of variance of each factor based on results from TABLE 4.3

4.4 PROPOSED DESIGN SOLUTIONS BASED ON INTERPRETATION

TABLE 4.7. Proposed Design Solutions

Factor 1: Straightforward and unambigious	
Kansei words:	Informative, Understandability, Responsive, Useful suggestion and Information, Direct, Accurate, Detailed, Easy to refine search, Satisfying, Clear, User-friendly, Easy-to-use, Nicer placement of objects, Concise, Interactive, Professional, Well-displayed search bar, Simple
Design Parameters:	Based on the results of analysis, the adjective that had the highest factor loading are informative, understandability and responsive, which are what users concerned the most. To improve the operational feeling of users: **1. Provide more detailed and straightforward information for the job seekers** 2. **Improve the functionality of the website: easier to refine search**
Factor 2: High artistical value	
Kansei words:	Nicer color, Nicer background, Attractiveness, Interesting, Nicer design, Nicer typography, Minimalistic, Relaxed, Professional, Eye-catching, Well-displayed search bar, simple, colorful
Design Parameters	Based on the results of analysis, the adjective that had the highest factor loading are nicer color, nicer background, attractive, interesting and nicer design. To improve the aesthetics feeling of users: **1. Do not use too many primary colors** **2. Use a more attractive background** **3. Minimalize the complexity in the design** 4. **Use a simple typography that is more relaxed**
Kansei Space 3: High flexibility	
Kansei words:	Accessible for disabled people, customizable interface, flexible
Design Parameters	To improve the flexiblility feeling of users: 1**. enable user to customize the interface such as font size, font color**
Kansei Space 4: “Wordy” feeling	

Kansei Word:	Wordy
Design Parameters	**1.Reduce the words as much as possible** **2. Use more graphic instead of words**

4.4.1 Comparative Analysis

Comparative studies are done to determine the difference between the sample websites used in the Kansei survey to justify the users' choice on their preferred sites. At the last part of the Kansei survey, the users are asked to select their preferred site to be used in helping the in the job searching process. The users need to choose among the four sample websites that they have just surfed and performed certain tasks using it. The results of the choices are presented in the table 20 below. Table 21 showed the global and local Alexa ranking of each of the websites. Alexa ranking is the web traffic ranking that is calculated based on the amount of traffic recorded by the calculator. From the table, it is shown that seek and jobsbank are having a very high rank and they are high traffic sites as compared to the other two websites.

TABLE 20. Figure of users' selection on their preferred site

Websites	SEEK(AU Private)	JOBSBANK (SG Government)	Monster (US Private)	Jobs Malaysia (MY Government)
Users' preferred site	25	25	15	8

TABLE 21. Alexa Ranking of the websites

Websites	Global	Country
SEEK	2,552	41(AUS)
JOBSBANK	49,928	399(SG)
MONSTER	95,858	788(MY)
JOBS MALAYSIA	22,373	966(MY)

4.4.2.1 Comparative study among four sample websites

To determine the difference between the four websites used in the survey.

Comparative studies are done to compare the difference in attributes and elements of the websites from one another.

TABLE 4.8. Comparative between sample websites

Website attributes	**jobsmalaysia**	**Jobsbank (sg)**	**Monster (my)**	**Seek (au)**
Apperance of the home page				
Choice of color	More than 3 primary color: 	3 primary color: 	2 primary color: 	2 primary color: 
Typography/ text formating	Simple and easy to read font, colored text on colored background	Simple and easy to read font, colored text on white background	Simple and easy to read font, black text on white backgorun d	Simple and easy to read font, black text on white background
Use of graphic	Many graphics in a page	Minimal and simple graphic are used	Minimal and simple graphic are used	Minimal and simple graphic are used
Use of low quality photography	Yes (low resolution logo)	No	No	No
Simplicity	Complex design -Cluttered layout, no white space	Simple design -Uncluttered layout and adequate white space	Simple design - Uncluttere d layout and adequate white space	Simple design -Uncluttered layout and adequate white space
Content of the home page				
Text/paragrap h	Wordy, long paragraph on the home page	No long paragraph on the home page	No short/ long paragraph on the home page	No short/ long paragraph on the home page
Copyright	copyright@201 5	copyright@2014	copyright @2015	copyright@20 15

Customizable content	Customizable font type, font size, font color and contrast for the disabled people	Customizable font size	Not customizable	Not customizable
Browse bar for easy searching	No	Yes	No	No
Placement of search bar	Small, not obvious	Centered, focused	Centered, focused	Centered, focused
Functionality				
Level of filtration (Advanced search function)	Low	High	High	High
Usability				
Simplicity	Not simple	Simple	Simple	Simple
Fast-loading pages	Optimum	Optimum	Optimum	Optimum
Fast-loading pages	Optimum	Optimum	Optimum	Optimum
Minimal scroll	Not minimal	Minimal	Minimal	Minimal
Consistent layout	Not consistent	Consistent	Consistent	Consistent
Placement of menu bar and menu bar items	Not prominent	Prominent	Prominent	Prominent
Cross-platform/browser compatibility		✓	✓ ✓	Only support IE9
		✓	✓ ✓	✓
		✓	✓ ✓	✓
		✓	✓ ✓	✓
W3C markup validation	XHTML1.0	HTML5	HTML 5	HTML5
Mobile Compatibility				

Based on the comparative study, there are certain significant difference between the four websites especially between the jobs Malaysia website and the rest of the websites. Simplicity is one of the attribute that are lacking in jobs Malaysia website as compared to the others.

In order to identify the major determinants website design and their relationship with the Kansei survey results, extensive literature review are conducted to present the relation of existing results of studies and the Kansei engineering survey conducted. The results of literature study can be represented with the table below.

TABLE 4.9. Literature review on website design

No.	Author of literature	Findings
1	Deborah E. Rosen, Elizabeth Purinton	• Adopting a minimalistic approach to the design of the homepage with eye-catching but appropriate graphics and categories that draw the web surfer further into the site appreas to be more effective. • Simplicity of a website makes the site to load faster and more appealing to users. (Rosen & Purinton, 2004)
2	Dave Gehrke, Efraim Turban	• Literature review of 47 papers and over 40 websites indicates that trend in designing websites is towards simplicity. • Revolving wingdings, flashing banner ads, grotesque background colors and texture and meaningless multimedia effects that require endless plug-ins will be extinct as e-commerce continues to

		advance. • Page loading speed is the most important criteria because users only want content and service and navigation efficiency. (Gehrke & Turban, 1999)
2	Fogg, BJ, Soohoo, Cathy, Danielson, David R, Marable, Leslie, Stanford, Julianne and Tauber, Ellen R	• This study evaluate credibility of websites based on users' evaluation proved that the utmost important criteria for a good website is it's design look because when evaluating the credibility of we sites, participants of the study commented on the design look more often than other web site features, 46.1% of their comments are on this particular feature (Fogg et al., 2003).

4.5 PROTOTYPE DESIGN BASED ON ANALYSIS

Existing MOHR official job search website:

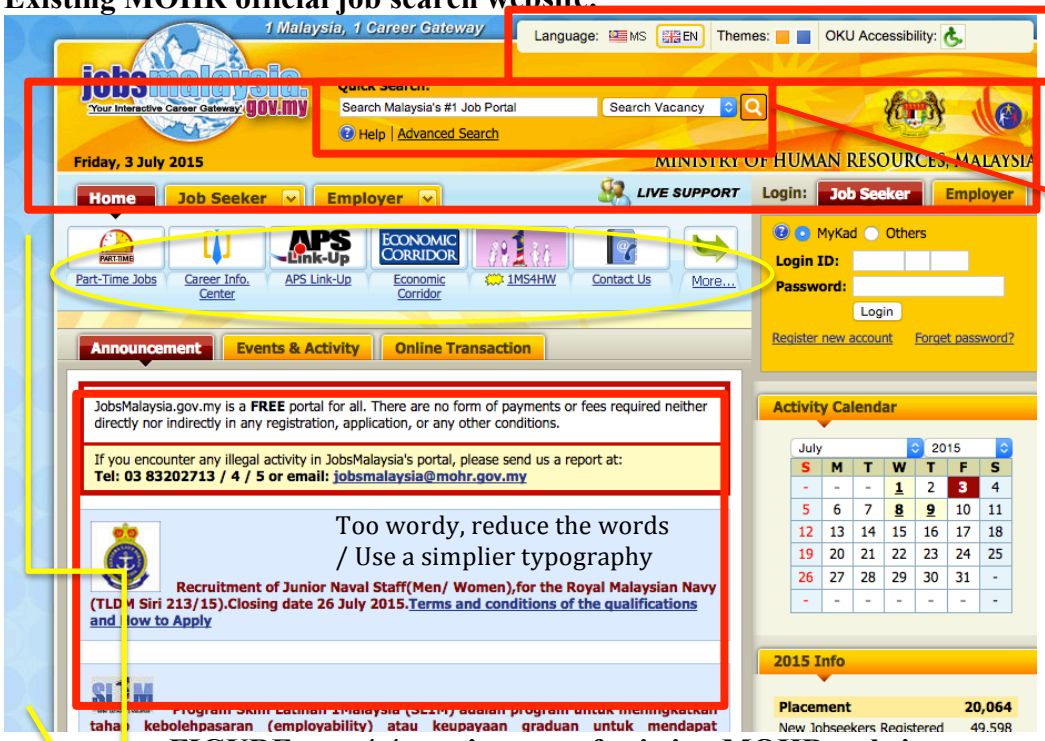


FIGURE 4.4. main page of existing MOHR website

Proposed prototype design:

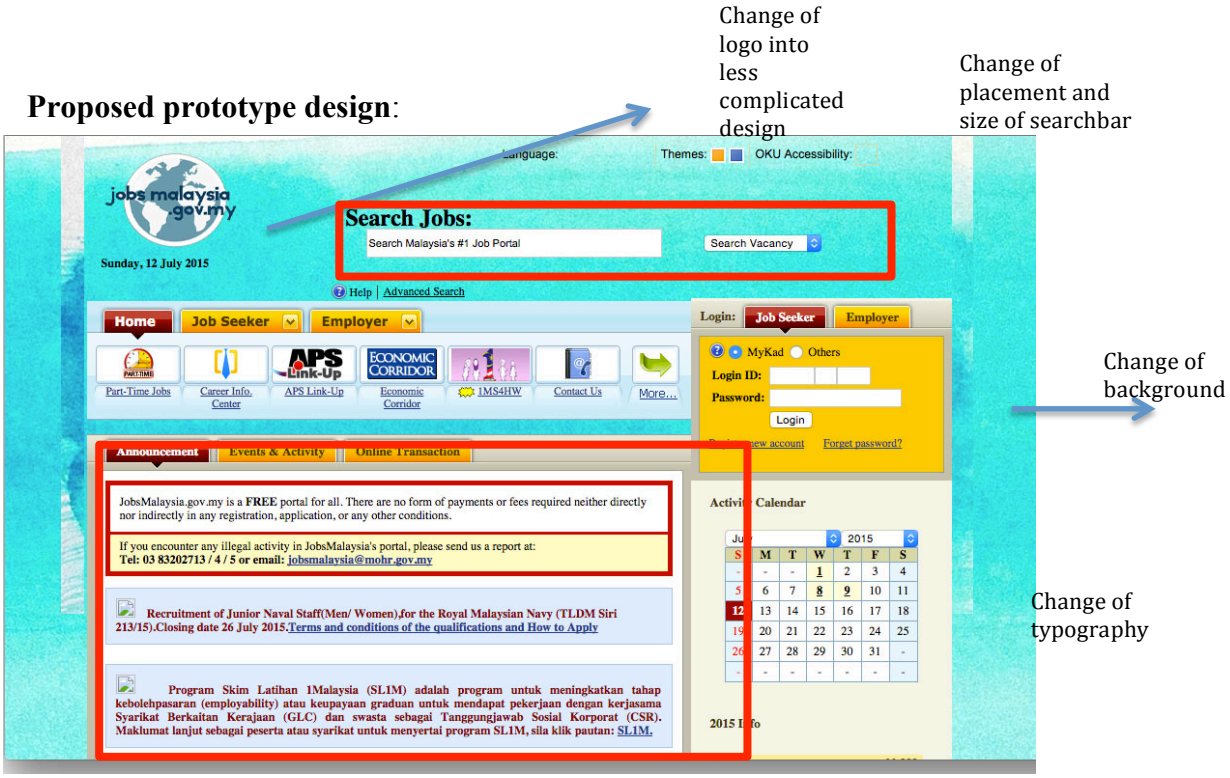
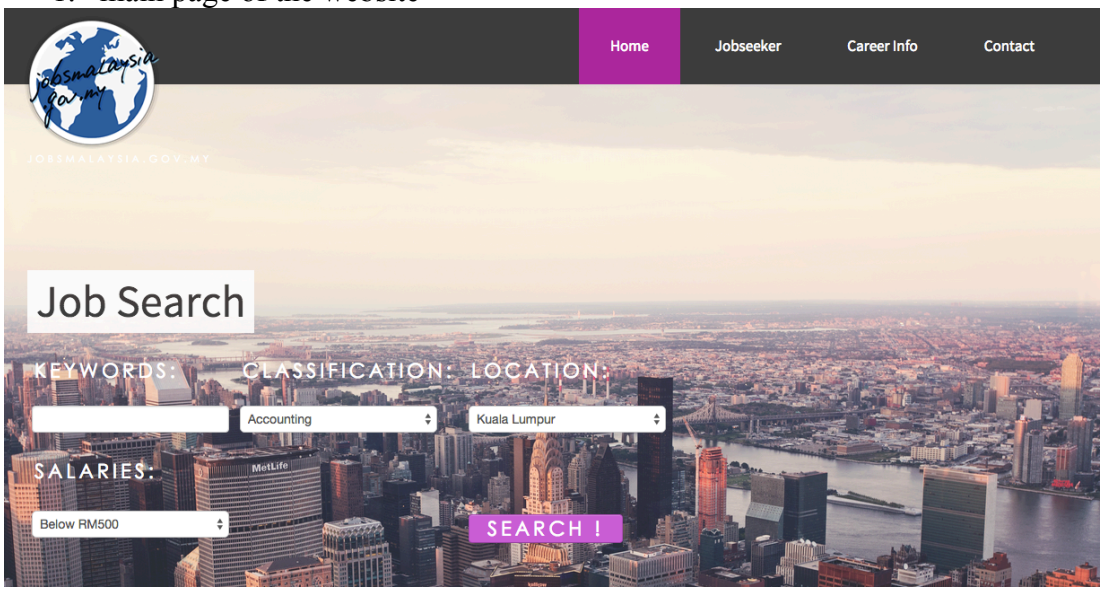
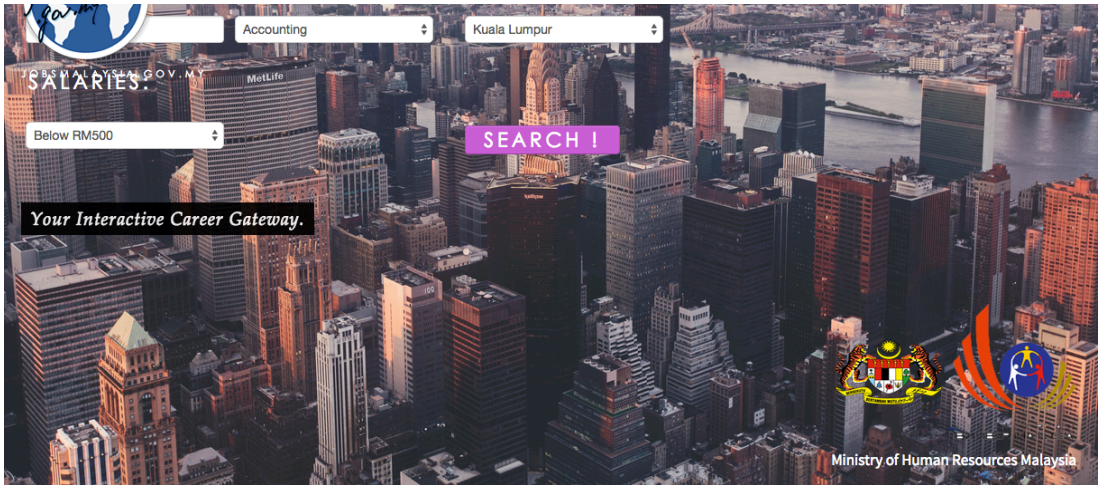


FIGURE 4.5. Proposed prototype design based on Kansei survey results

Final design of prototype:

1. main page of the website

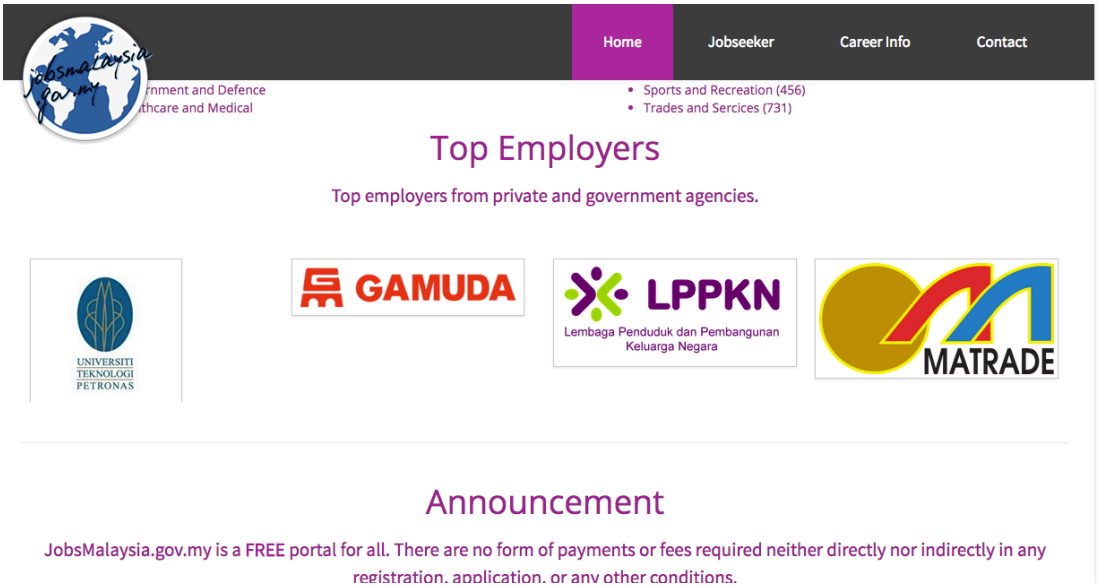


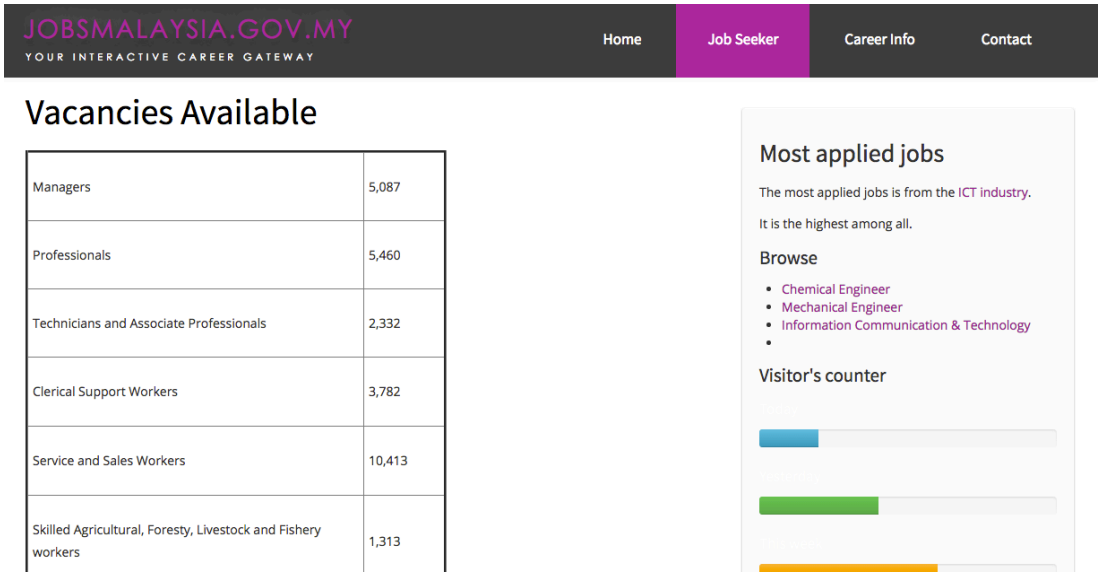


2. Insert browse bar to ease the users for searching

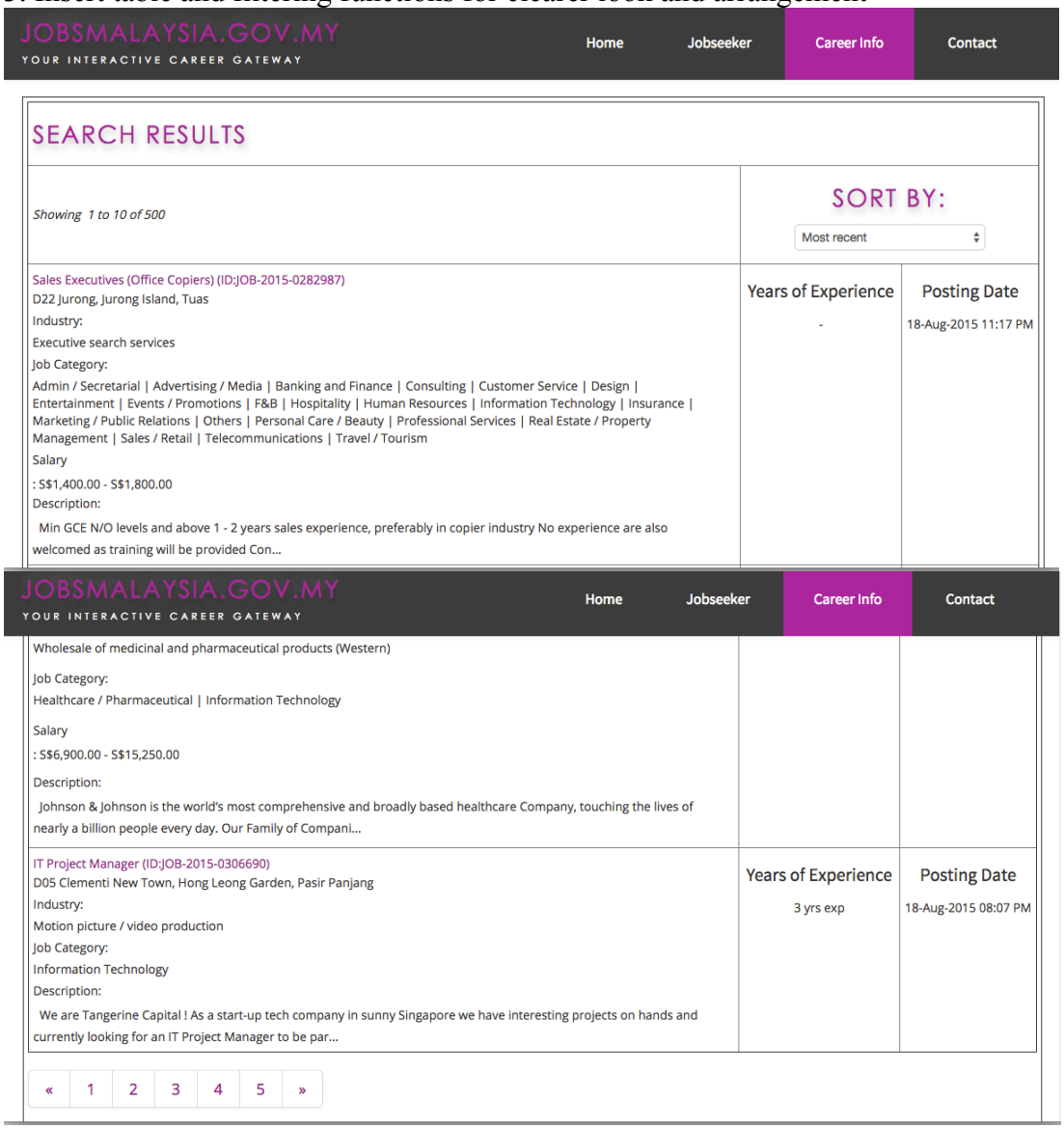
Browse job

- Accounting(1103)
- Advertising, Arts and Media(989)
- Banking and Financial Services(883)
- Call Centre and Customers Service(870)
- CEO and General Management(431)
- Community services and development(92)
- Construction(304)
- Consulting and Strategy(321)
- Design and Architecture(994)
- Education and Training(1032)
- Engineering(557)
- Farming, Animals and Conservation
- Government and Defence
- Healthcare and Medical
- Hospitality and Tourism (566)
- Human Resources and Recruitment (642)
- Information and Communication Technology (1342)
- Insurance and Superannuation(1356)
- Legal (232)
- Manufacturing, Transport and Logistics (893)
- Marketing and Communications (1123)
- Mining, Resources and Energy (542)
- Real Estate and Property (347)
- Retails and Customer Products (546)
- Sales (958)
- Science and Technology (908)
- Self-employment (231)
- Sports and Recreation (456)
- Trades and Sercices (731)





3. Insert table and filtering functions for clearer look and arrangement



4.5.1 Usability Testing on prototype

Usability test was carried out among 10 users to obtain their Kansei and impression on the website with new design and layout. In this usability test, Semantic differential (SD) scale method was used. Nonetheless, this usability test is comparably taking lesser time than the previous one because only a few Kansei words are asked in this Kansei survey.

5 users among the 10 users are doing the test in the 1st order, which is the existing website first followed up by the prototype website. Nonetheless, the other 5 users are doing the test in another order. The purpose of conducting the test in two different orders is to make sure there is no order effect that might affect the accuracy of the results.

4.5.1.1Results of Kansei survey 2

The table below shows the result Kansei survey on the two websites, the existing website authorized by MOHR Malaysia and the modified website based on the original layout of the website. The modification are based on the result from Kansei survey 1 that was conducted to obtain the user impression on the existing government website. Table 23 shows the results of the survey. Columns in red represent the results of users' feedback for the existing website while columns in blue represent the results of users' feedback for the modified website.

Table 4.10. Results of Kansei survey 2

Kansei word on Semantic scale	**Users rating on their Kansei**																			
	User 1		*User 2*		*User 3*		*User 4*		*User 5*		*User 6*		*User 7*		*User 8*		*User 9*		*User 10*	
Not nicer color- nicer color	1	3	2	4	1	3	3	4	3	5	2	3	2	3	1	3	1	4	2	5
Not nicer background- nicer	2	3	1	4	2	5	1	3	2	4	2	4	2	3	3	3	4	4	1	3

background																				
Not wordy-wordy	4	3	5	4	5	4	5	4	4	3	3	2	5	2	5	3	5	2	4	3
Not simple-simple	1	4	2	4	2	4	3	4	3	5	3	5	3	5	2	5	1	3	1	4
Not nicer placement of search bar-nicer placement of search bar	1	3	1	4	1	4	1	3	1	3	2	3	2	3	1	4	1	5	2	4

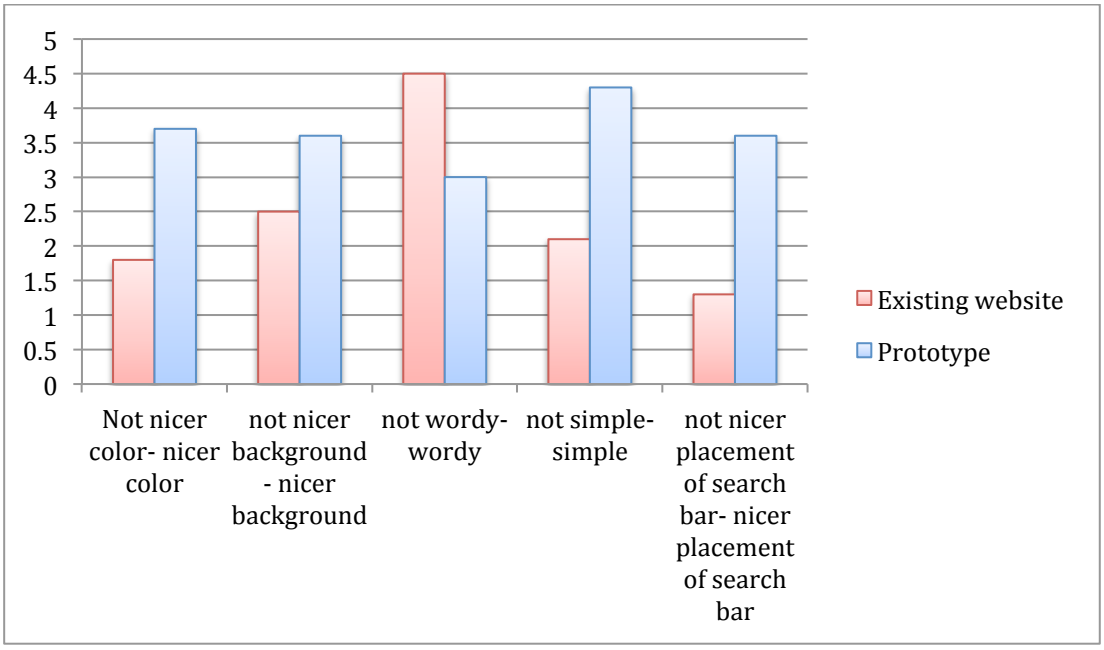


FIGURE 4.6. Results of Kansei survey 2

Based on the usability test results, it can be concluded that the results of Kansei survey 2 showed a better results for the prototype design than the existing design. Modification made on the existing design trigger a better impression and emotions for the 10 users who have sat for the usability test. In a nutshell, the results of usability test show that modification made on the existing MOHR website based on the results of a Kansei usability test improved the feedback and impression of a user towards the website. Therefore, applying Kansei survey in the development of website in obtaining users' impression towards the website based on the concept of human-oriented product development is doable and feasible. It can serve as a

framework for developers and UX test engineers to measure the usability of a websites and utilize it as the design solutions in the process of research and development.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

The problem statements on the usability issue on government website have been constructed to provide an opportunity of investigation. The objectives and scope of study for this research are framed around the stated problems with expectation to create an implementable solution that can be suggested and promoted to the government as a solution to the existing issues. Furthermore, literature reading with the aim to discover gaps among various previous works has been carried out and literature review and comparative study has also been done. A clearer direction and various useful parameters are identified through the process of literature study. These parameters are then implemented in the step-by-step methodology in this research. It includes development methodology such as the tests set up and methods of data collection along with justification of selected criteria. Personal and Projected timeline are also shown through the key milestones table and organized Gantt chart.

Research methodologies that provide a guideline for the research to carry on and presented in an organized way are recorded sequentially. Recommendation in the research is to narrow down and adjust the parameter of the study. The study can be done by identifying the available tools and technologies, and focus on the study of certain methodology that are suitable to be used in Malaysians' context.

This project has showed that users' impression on a website can be captured by the implementation of KE Type 1- categgory classification. The feedbacks obtain from the informal usability test using Kansei words in survey form are useful to help

improve the current MOHR job portal as well as other existing e-government websites to better serve the users.

CHAPTER 6

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